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NEXT GENERATION WEATHER RADAR (NEXRAD): ARE WE COVERED?

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Next Generation Weather Radar (NEXR...

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

OF THE

COMMITTEE ON SCIENCE

U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

OCTOBER 17, 1995

[No. 25]

Printed for the use of the Committee on Science

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*Ranking Minority Member
**Vice Chairman

CONTENTS

WITNESSES

Page

July 13, 1995:
- Honorable Stephen E. Buyer, a Representative in Congress From the Fifth District of Indiana 19
- Honorable George W. Gekas, a Representative in Congress From the 17th District of Pennsylvania 30
- Honorable Phil English, a Representative in Congress From the 21st District of Pennsylvania 34
- Honorable Wally Herger, a Representative in Congress From the 2nd District of California 39
- Honorable Mark E. Souder, a Representative in Congress From the 4th District of Indiana 230
- Honorable William M. Thornberry, a Representative in Congress From the 13th District of Texas 238
- Elbert W. Friday, Jr., Director, National Weather Service, National Oceanic and Atmospheric Administration, Washington, D.C. 246
- William E. Gordon, Chairman, NEXRAD Panel, National Weather Service Modernization Committee, National Research Council, Washington, D.C. 258
- Jack L. Brock, Jr., Director, Defense Information and Financial Management Systems, Accounting and Information Management Division, United States General Accounting Office, Washington, D.C. 369

APPENDIX

Statement of Honorable Earl Pomeroy 444

NEXT GENERATION WEATHER RADAR [NEXRAD]: ARE WE COVERED?

TUESDAY, OCTOBER 17, 1995

House of Representatives,
Committee on Science,
Subcommittee on Energy and Environment,
Washington, D.C.

The Subcommittee met, pursuant to call, at 1:05 p.m. in Room 2318, Rayburn House Office Building, Hon. Dana Rohrabacher [Chairman of the Subcommittee] presiding.

Mr. Rohrabacher. This is a hearing today to provide an opportunity for Members of the Energy and Environment Subcommittee to get the facts on the status of the ongoing modernization program of the National Weather Service forecast.

It is also an opportunity to address the concerns expressed by some of my colleagues that the current next-generation radar, or NEXRAD, plan leaves gaps in coverage that could threaten the public safety and health.

We will focus today on two reports.

At the request of Congress, the National Research Council took a look at the potential gaps in coverage.

The NRC found that weather service nationally will be substantially improved under the modernization program.

However, it concluded that five regional areas have potential problems under the current siting plan. We have invited Members from those areas to testify today, and we will also hear from the Chairman of the panel that authored that report. We also have with us a representative of the GAO to discuss a study published earlier this year.

It questioned the reliability of the newly installed equipment, particularly at the Department of Defense installations. Although we will inevitably concentrate on the problem areas today, this subcommittee and the Full Science Committee are firmly on record in support of the modernization program.

So I cannot emphasize that enough. Because there are some problems does not mean that the effort to modernize the system should not have been taken.

That is why the NOAA authorization bill, which passed the House on Thursday, provided for full funding to keep the modernization program on schedule.

Both the NRC and the GAO reports are clear in concluding that 1950s generation radar cannot and should not do the job of providing severe weather forecasts when 1990s technology is available.

As part of our oversight responsibility, we must be sure that problem areas are addressed, even though the overall program seems to be going in the right direction.

So at the same time, with the fact that there are some problem areas, we should not put roadblocks in the way of a program that will greatly benefit the vast majority of Americans.

Now, my friend Jimmy Hayes is not here, the Ranking Member of the Subcommittee, but I understand that there is a request——

Mr. ROEMER. Mr. Chairman, I would make a unanimous consent request to have Mr. Hayes' statement entered into the record.

Mr. ROHRABACHER. Without objection.

[The hearing charter and the prepared statements of Chairman Rohrabacher and Ranking Democratic Member Hayes follow:]

SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE
UNITED STATES HOUSE OF REPRESENTATIVES

HEARING CHARTER

OCTOBER 17, 1995

NEXT GENERATION WEATHER RADAR (NEXRAD): ARE WE COVERED?

I. OBJECTIVES OF HEARING

The hearing will explore the National Weather Service's (NWS) current plans for providing Next Generation Weather Radar (NEXRAD) coverage for the United States. The hearing will focus on the recently released National Research Council report, "Toward a New National Weather Service: Assessment of NEXRAD Coverage and Associated Weather Services," and the General Accounting Office May 1995 report, "Weather Forecasting: Radar Availability Requirement Not Met." Both reports raise concerns about areas of the country that may be left with less than optimal coverage under the Department of Commerce's Fiscal Year 1996 National Implementation Plan For the Modernization of the National Weather Service.

II. BACKGROUND

In the late 1980s, NWS embarked on a modernization and restructuring of its operations and associated field office structure. The cornerstone of the NWS modernization plans is the NEXRAD, an enhanced radar system. The NEXRAD uses "Doppler Effect" technology that allows for a more accurate and greater-distance detection of weather patterns associated with tornadoes and other severe weather. The NWS plans to replace 128 older radars that were concentrated east of the Rocky Mountains with a combination of 22 operational Department of Defense (DOD) NEXRADS and 116 operational NWS NEXRADs which will be deployed in the contiguous United States. The DOD radars are all operated by the Air Force. To date the NWS has maintained that the 138 NEXRAD sites in the contiguous United States are sufficient to provide national coverage for the detection of severe weather.

The NWS is in the process of installing and beginning operation of its NEXRADs. NWS is scheduled to complete its installations by the end of fiscal year 1996. As of February 1995, 81 NEXRADs have been installed by NWS and 22 by DOD.

The NWS modernization plan also calls for the creation and deployment of advanced technologies, such as: a new series of geostationary meteorological satellites (GOES I-M); an advanced computer/telecommunications system that will help forecasters assimilate weather data, analyze fast-breaking storms, and quickly prepare and assimilate warnings and forecasts known as Advanced Weather Interactive Processing System (AWIPS); and an Automated Surface Observing System (ASOS) designed to replace manual weather observations now taken at 250 NWS sites. The NWS reorganization component of the modernization plan calls for the replacement of the current 52 NWS forecast offices, and 200 smaller offices, including NWS offices and meteorological observatories, with 118 modernized weather forecast offices (116 in the contiguous U.S. and one each in Alaska and Hawaii).

Significant questions have been raised by the General Accounting Office (GAO) about the performance, costs, and delivery schedules of both ASOS and AWIPS. Also of concern is the lack of a fixed price contract for additional NEXRADs and the apparent inability of the DOD NEXRADs to meet the agreed-upon 96 percent operational availability guideline. According to the GAO report, "Weather Forecasting: Radar Availability Requirements Not Met," in 1994 and 1995 only 38 to 90 percent of the DOD radars met the requirement in any given month.

In selling the $4.5 billion dollar modernization initiative to Congress, NWS has repeatedly stated that the new consolidated modernized system will dramatically improve weather forecasting for the nation. NWS also indicated that significant reductions in staffing could be achieved through modernization. In 1989, the NWS set a goal of reducing its staff level by 1,072 upon completion of modernization. Although the original goal of establishing 115 modernized offices has only been increased by three over the last six years (to 118), the NWS has reduced its post-modernization staff savings by roughly sixty percent to 422.

Some controversy has arisen over the decommissioning of older radars and the siting of new NEXRADs. Communities in which existing radars are being replaced by distant NEXRADs, and those which lose their forecast offices fear that the service in their areas may be degraded. In light of these concerns, Congress included language in Public Law 102-567 requesting a National Research Council (NRC) study to assess the adequacy of NEXRAD coverage for the nation to ensure that there is no degradation of weather services as a result of this aspect of modernization.

After a 6-month study, the NRC concluded that weather services on a national basis will be improved substantially under the current NEXRAD network. The study, however, also concluded that in areas where the pre-NEXRAD radar is not replaced, and service is to be provided by a NEXRAD located some distance away, there is a potential for some degradation in coverage. These areas of the country include the pre-NEXRAD sites located in Northern Alabama, Northern Indiana, Northwestern North Dakota, Northwestern Pennsylvania, and Southeastern Tennessee.

The Department of Commerce is currently reviewing the NRC report, and the Secretary will submit to Congress a report detailing any changes to the NWS modernization plan the Department deems necessary based on the conclusions of NRC's work. Commerce has indicated that the Secretary's review will be submitted to Congress in November of 1995.

III ISSUES

* Will the current NWS modernization plan markedly improve severe weather forecasting in the United States?

* Does the NWS National Implementation Plan need to be altered based on the conclusions of the NRC report?

* Is the NWS modernization proceeding in a timely and efficient manner?

* If the NWS decides to alter its modernization plans, can additional NEXRADs be acquired at a reasonable cost?

* Is DOD adequately coordinating its coverage with NWS?

* What effect will the current problems in ASOS and AWIPS have on NWS' ability to provide radar coverage for the nation?

* Why have staffing requirements changed so dramatically since the original NWS modernization plan?

* When will modernization be completed?

HEARING OF THE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE
UNITED STATES HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515

Next Generation Weather Radar (NEXRAD): Are We Covered?

Tuesday, October 17, 1995
1:00pm - 4:30pm
Room 2318 Rayburn HOB

Witness List

Representative Stephen E. Buyer

Representative Phil English

Representative George W. Gekas

Representative Wally Herger

Representative Mark E. Souder

Representative William M. Thornberry

Panel

Dr. Joe Friday
Director
National Weather Service
National Oceanic and Atmospheric Administration
Washington, DC

Mr. William Gordon
Chairman
NEXRAD Panel
National Weather Service Modernization Committee
National Research Council
Washington, DC

Mr. Jack L. Brock, Jr.
Director
Defense Information and Financial Management Systems
Accounting and Information Management Division
United States General Accounting Office
Washington, DC

OPENING STATEMENT--OCT. 17, 1995
CONGRESSMAN DANA ROHRABACHER

This hearing is an opportunity for members of the Energy and Environment Subcommittee to get the facts on the status of the ongoing modernization program at the National Weather Service.

It is also an opportunity to address the concerns expressed by some of my colleagues that the current Next Generation of Radar, or NEXRAD, plan leaves gaps in coverage that could threaten public health and safety.

We will focus today on two reports. At the request of Congress, the National Research Council took a look at the potential for gaps in coverage. The NRC found that weather service nationally will be substantially improved under the modernization program. However, it concluded that five regional areas have potential problems under the current siting plan.

We have invited members from those areas to testify today and we will also hear from the chairman of the panel that authored the report.

We also have with us a representative of the GAO to discuss a study published earlier this year that questioned the reliability of the newly installed equipment, particularly at Department of Defense installations.

Although we will inevitably concentrate on the problem areas today, this subcommittee and the full Science Committee are firmly on record in support of the modernization program.

That is why the NOAA Authorization Bill which passed the House Thursday provided full funding to keep the modernization program on schedule.

Both the NRC and GAO reports are clear in concluding that 50's generation radar cannot and should not do the job of providing severe weather forecasts when 90s technology is available.

As part of our oversight responsibility, we must be sure that problem areas are addressed. At the same time, we should not put roadblocks in the way of a program that will greatly benefit the vast majority of Americans.

Congress of the United States
Washington, DC 20515

October 17, 1995

Jimmy Hayes

Jimmy Hayes
Member of Congress

Opening Statement of Congressman Jimmy Hayes (D-LA),
Ranking Democrat on the Subcommittee on Energy
and Environment, regarding NEXRAD coverage hearing

Mr Chairman, as the Subcommittee well knows, my home State of Louisiana has been the recipient of many of natures worst weather happenings in recent memory. The geographic location of my South Louisiana District has made me especially and intimately cognizant of the dangers to our lives and livelihoods that natural disasters pose. Early warning is indeed a key ingredient to preparedness, and the Next Generation Weather Radar (NEXRAD) of the National Weather Service has proven to be an effective and efficient early detection system.

In Louisiana, NEXRAD coverage is sufficient. I worked for many long months last year with the NEXRAD Joint System Program Office and the Federal Aviation Administration to ensure the timely installation of a NEXRAD system at the Lake Charles, Louisiana Regional Airport. I am pleased to note the outstanding contribution to emergency preparedness and early storm warning that the NEXRAD system and the NWS staff at that site have made to our communities.

But, as the Subcommittee will be examining today, the National Research Council's (NRC) recent report identified several areas throughout the nation that have inadequate coverage where degradation of radar coverage may occur. In fact, two of the at-risk locations are represented by Members of this Subcommittee, our colleagues Bud Crammer and Tim Roemer. When the full Committee overwhelmingly adopted the Crammer compromise amendment during the mark up of the NOAA Authorization Bill, we committed to guarantee not only that funds could be made available to such under-served areas but also that appropriate steps are taken to provide weather detection and protection for these citizens. We are fulfilling part of that promise with these proceedings here today.

Mark Twain once said that "everyone talks about the weather but nobody does anything about it." I hope that is not the case in this instance. I eagerly await the testimony of the witnesses and the Members, and I look forward to working with other Subcommittee Members, Secretary Brown, Dr. Friday and the NWS to make necessary adjustments and deal with the problem of NEXRAD under-coverage.

Mr. ROHRABACHER. Also, Members of our Subcommittee are concerned with this issue, and I will recognize them for opening statements. And, as Mr. Wamp is not here, I think what we will go to is directly to——

Mr. Roemer, do you have an opening statement?

Mr. ROEMER. I do, Mr. Chairman.

Mr. ROHRABACHER. We will take an opening statement from Mr. Roemer and then move to our first witnesses who are other House colleagues.

Mr. Roemer?

Mr. ROEMER. Mr. Chairman, I have a statement I would like to enter into the record.

Mr. ROHRABACHER. Without objection.

Mr. ROEMER. Mr. Chairman, first of all I would like to thank you for holding these hearings which are crucial to my citizens in northern Indiana, and to many people throughout the United States.

I want to recognize the importance of pursuing a modernization plan in the United States.

I do not have any qualms with the modernization plan that protects our citizen from any kind of weather, harm, and severe weather that may come into their environment, into their state, into their locality.

Certainly the modernization plan laid out by the Weather Service has many positive and strong attributes, but it also has some great deficiencies.

We have been working very closely with Dr. Friday of the National Weather Service, who has been very cooperative, very conciliatory, very willing to learn and visit our District and meet with our citizens and get public input from our citizenry, and to recognize as the National Research Council did that we have deficiencies, that we have gaps, that we have problems in different environments and in different districts in the United States of America.

Certainly in the Third District of Indiana that I represent we have a huge deficiency in that we have severe lake-effect storm warnings; we have snow storms that come off and can dump 6 and 7 inches of snow in a matter of hours, and that presents a real public hazard.

It represents a hazard to our school children that may not have to get on a bus at six o'clock in the morning if we can get them warning, adequate warnings, sufficient pro-active warning when that weather comes off of Lake Michigan and dumps snow into the Third District of Indiana.

I understand that many of my Republican colleagues from Indiana, Mr. Buyer and Mr. Souder, are here to testify about this corridor that sweeps toward the east and toward the south from my District and into the State of Ohio where we have a gap in the radar coverage right now.

We do not have sufficient radar coverage, let alone the unique situation confronting northern Indiana where we can get dumped on by a severe lake-effect snow storm or a thunder storm, or we can have a low-flying tornado which is not picked up by the current radar in Romeoville, Illinois, and in Grand Rapids, Michigan.

We do not have sufficient coverage in northern Indiana to protect our citizens.

As we allocate all kinds of resources in our budgets, we just allocated in this committee two weeks ago hundreds of millions of dollars for the shuttle and its safety, which I support, so we certainly can make sure in our modernization plans in the United States of America where we have the most unpredictable and inclement weather in the world, that we are getting adequate coverage and sufficient warnings out to our citizens to protect them—whether they be farmers, whether they be school children getting on buses, whether they be somebody on a golf course—we want to make sure people are protected.

So I think, Mr. Chairman, you having these hearings are very important to us today.

I would encourage our distinguished panel, which happens to be entirely Republican this afternoon, Mr. Chairman, that when we have worked together on this issue in this committee in the past and have had, I hope, the bipartisanship to work on this issue in a cooperative spirit.

I hope that we do not come up with a reconciliation bill next week that cuts this process by 25 or 30 percent and thereby removes our ability to protect our citizenry and to get adequate warning out there with the NEXRAD Radar System in our District and in our State.

So again, Mr. Chairman, thank you for your vision in having this hearing.

I welcome the Republican panel's foresight and vision in helping us solve this problem in a bipartisan way.

It is not just a Republican or Democratic district that encounters this problem.

Thank you.

[The prepared statement of Mr. Roemer follows:]

Opening Statement, Rep. Tim Roemer, Subcommittee on Energy and Environment, Tuesday, Oct. 17, 1995

Mr. Chairman, earlier this year Mr. Cramer and I worked together on legislation that prompted the National Weather Service to reevaluate the weather service modernization plan. This effort, conducted by the National Research Council, is in part why we are here today, and I want to thank the Chairman for providing this opportunity for us to revisit this issue and update our concerns.

As Mr. Cramer and I both knew, and as the NRC has confirmed, the area of the country that I represent, Mr. Cramer's own region, and three others are simply underserved by the current modernization plan. This is not a criticism of modernization. The modernization is needed and welcome. Dr. Joe Friday, the Director of the National Weather Service, who will testify shortly, has been most forthcoming to our concerns. Dr. Friday has met with and consulted a large number of civil defense and weather watch persons in the Third District of Indiana, and has continually endeavored to learn and understand our concerns.

But, as with any large scale, ambitious plan, the modernization plan has a few flaws. When the NRC began its effort, the people of north central Indiana were already in action. Everyone involved in civil defense and weather watching and prediction participated in a district wide effort. Dozens of officials submitted detailed testimony. These people combed Indiana for scientific evidence detailing our history of extreme and severe weather. We collected new stories, weather reports, photographs, charts and other records. Our meteorologists developed video documents of the lake-effect and tornado weather that plague north central Indiana, and video evidence that the current NEXRAD equipment was not providing adequate coverage.

Finally, the citizens of my district came through with flying colors. I requested that people provide direct and anecdotal information about their experiences with our severe weather. Mr. Chairman, with the help of my Chambers of Commerce, the response was tremendous. We collected dozens of pieces of new details of weather events, even more information about old weather events that many had forgotten, hundreds and hundreds of letters, thousands of postcards, and countless signatures expressing concern.

This unified effort produced a multi-media document that the weather service itself acknowledged was one of the very best presented to the NRC for consideration. I am proud to have been able to lead this effort, and even prouder of the many Hoosiers in my district that made our presentation to the NRC possible.

I am also pleased to be hear today to receive an update on this process that my constituents have been full participants in, and look forward to hearing the plans for alteration of the modernization plan that the Commerce Department will announce in just a few weeks. I want to again thank my colleague, Mr. Cramer, for his exceptional work in this area, and to welcome my Hoosier colleagues to this hearing today, who care deeply about this issue and about the safety of the people in the state we represent.

Mr. ROHRABACHER. Thank you, Mr. Roemer. I appreciate you being here and making this bipartisan because you are here. Otherwise, it would seem to be only one party represented.

I agree with you that we should not be cutting the modernization effort. That is one of the reasons why this chairman, as well as backed up by the rest of the Committee, fought to see that there were specific cuts that we made in our budget rather than across-the-board cuts which was proposed by the Administration.

Across-the-board cuts in budgets always end up treating everything the same—weather modernization is treated the same as a promotion program for some global warming effort or something—and the fact is that there are different values on different items in the budget.

Weather modernization effects the lives of each and every one of our citizens. That is why there is so much attention today being paid by our Members to this, and especially one to my left, Zack Wamp, who is very interested in this and I yield to Mr. Wamp.

Mr. WAMP. Thank you, Mr. Chairman.

I do ask unanimous consent to submit a written statement for the record.

Mr. ROHRABACHER. Without objection.

Mr. WAMP. But I would like to add that one of the leaders of this initiative to make sure that the transition to NEXRAD leaves no systems or regions in jeopardy is my good friend from Huntsville, Alabama, Congressman Bud Cramer. That is why I joined him, with many of the Members present today, in support of his proposals last week on the House Floor which passed on a voice vote with strong bipartisan support, speaking on the Floor.

This is one of those issues that we do in a bipartisan spirit in working together because this is health and safety. This is not a parochial or partisan interest; this is a true health and safety concern.

A week before last, Hurricane Opal came from the Gulf of Mexico up through Alabama, through Bud Cramer's District, and for the first time in Southeast Tennessee that we have been affected by a hurricane like that, I guess in a long time, and certainly in my lifetime, there were big trees down in my backyard, many of them, all the way on 60 acres behind my house, just ripped through like a tornado.

That storm came from the southeast—excuse me, from the southwest, which most storms in the southeast come from the southwest or the west; they do not come from the northeast. Yet, the closest office of the Weather Service now, with the closures imminent, is 114 miles to the northeast of Chattanooga, Tennessee.

Then Congressman Cramer has the same problem. As the National Research Council identified five districts in the country, I think some of those are represented here today that could be trouble spots, and two of those are contiguous to Congressman Cramer's and my Districts.

Our local media had to call Morristown last week with Hurricane Opal, 114 miles away. The phone did not get answered. It was a hurricane. This is critical. It is not a bit funny to anybody, Republican, Democrat, rich, poor, black, white, young or old.

So we have to work together.

We need Secretary Brown to let us know as soon as possible in the Department of Commerce whether or not he is going to recognize the National Research Council's findings that these five areas need help.

I am glad Congressman Cramer is here so that I can sing his praises one more time for his excellent leadership last week in a bipartisan way recognizing that these five districts need relief.

We need to work together, and we need Secretary Brown's help. We need the Administration's help, and we need to come together as Republicans and make sure that there are no deficiencies in the new NEXRAD system as we go through this transition. I yield back the balance of my time.

[The prepared statement of Mr. Wamp follows:]

STATEMENT OF THE HONORABLE ZACH WAMP

Tuesday, October 17, 1995

Thank you, Mr. Chairman. I would like to commend Chairman Rohrabacher for holding hearings on such an important topic.

During the full Science Committee markup of the National Oceanic and Atmospheric Administration Authorization Act of 1995, I supported an amendment offered by my friend, Congressman Cramer, to streamline the certification process in the National Weather Service Modernization Act.

And just a few days ago, during debate of the Omnibus Civilian Science Research Act on the House floor, I supported the same amendment offered by Congressman Cramer. I did this because it is an issue of public health and safety. I don't believe this should be a partisan issue, and neither do the folks back home.

As most of us know, the Weather Service Modernization Act, which was signed into law just a few short years ago, established guidelines for the modernization of the National Weather Service. One key element of that law requires that no weather service office can be closed or automated without a certification that the closure would not result in degradation of service to the affected area.

The Weather Service's modernization plan will eventually reduce the number of Weather Service offices from about 300 to a little more than 100. One of the many offices slated for closing is in my district, Chattanooga, Tennessee.

As the Weather Service continues to modernize its radars with the NEXRAD systems, it is critical that we do not have soft spots in our weather radar coverage. Southeast Tennessee, which I represent, has been identified by the National Research Council as one of five vulnerable areas in the country.

Just a few short weeks ago, Hurricane Opal worked its way up through the Gulf of Mexico, causing lots of damage throughout the southeastern part of the United States. Hurricane Opal is a clear reminder of the need to have adequate radar coverage to help protect the life and property of our nation's citizens.

Unfortunately, since Chattanooga's current radar is scheduled to close, the folks in southeast Tennessee will have to rely on the Weather Service office in Morristown, Tennessee, some 114 miles to the northeast.

Mr. Chairman, I am not opposed to the NEXRAD systems, and I understand that the Weather Service office in my district may have to close. But I want to make it very clear that there are areas in the U.S. that do not and will not have adequate radar coverage with the loss of their existing Weather Service office.

The gentleman from northern Alabama, Mr. Cramer has the same problem. In fact, we share adjacent districts.

It seems to me that the National Weather Service can kill two birds with one stone by installing a NEXRAD system somewhere between our two districts. In that scenario, both of our areas would be covered and less money would have to be spent. However, there may be other alternatives that should be looked at by the Weather Service.

With that, Mr. Chairman, I yield back the balance of my time.

Mr. ROHRABACHER. Thank you, Mr. Wamp.

With that, I would like to yield to Mr. Cramer for a few moments.

Mr. CRAMER. Thank you, Mr. Chairman.

I will be brief.

I just literally flew in and got in.

I think it is important that we have these hearings. We have for more than two years been trying to hold the National Weather Service's feet to the fire in trying to look at their modernization plan to see which areas are left out, should they be left out, and so we have brought this issue full force ahead.

I have many concerns about the modernization plan, particularly as it impacts my areas and areas in Indiana. My area includes Congressman Wamp's area as well, because we share that southeastern Tennessee, northeastern Alabama area.

We have had studies even before we engaged in this process to get the National Research Council to look at this plan.

The Florida State study indicated that we and others were in gap areas, and our citizens could in fact be very vulnerable to this modernization plan.

So we have had a tough job to try to balance budget issues, as well as protect the citizens of our districts and to make sure that they are not used as guinea pigs in this what could be a very dangerous modernization plan.

Now we are under even a tougher budget framework.

We have got issues that we brought to the Floor last week that many of you spoke about that co-sponsored the amendment that I offered regarding the Weather Service offices.

So I am very concerned about this predicament and what in fact it does to put additional pressure on this plan and to leave our citizens, and in many cases young children as in Mr. Roemer's weather case there, his children are practically on the road before they have any weather information because they just are not adequately covered there.

These are very real, very front-line issues and we cannot let budget items stand in the way.

Thank you, Mr. Chairman.

Mr. ROHRABACHER. And again, that is the reason why we must make sure that items like this where people's lives and safety are at stake are at a higher priority than other items in the budget where people's lives and health are not at stake.

That is one of the arguments that we are using at a time when we are having to reduce budgets. That is why we have to have the courage to set spending priorities. That is what this Congress is all about.

I would ask unanimous consent that those Members testifying today, who will be testifying in one moment, will be allowed to sit as guests of the Subcommittee and question witnesses after they provide their testimony.

Without objection.

[No response.]

Mr. ROHRABACHER. You are all invited after you give your testimony today, if you would like to join us and question the witnesses about your particular areas, or in general about the weather modernization program, you are certainly welcome to join us.

I would now ask—and we have just done this in alphabetical order—if you could—you are welcome to put anything into the record—if you could summarize, we would be grateful for that.

Mr. Buyer, you will be first.

STATEMENT OF THE HONORABLE STEPHEN E. BUYER, A REPRESENTATIVE IN THE UNITED STATES HOUSE OF REPRESENTATIVES FROM THE 5TH DISTRICT OF THE STATE OF INDIANA

Mr. Buyer. Thank you, Mr. Chairman.

First of all I would ask unanimous consent that my entire statement be submitted for the record, and that all extraneous material attached thereto be made a part of your record.

Mr. Rohrabacher. Without objection.

Mr. Buyer. I had also advised the chairman that Mr. Gekas and I are involved in a markup in the Judiciary Committee on Immigration that is occurring right now, so I will be brief.

Mr. Chairman and Members of the Committee, and my colleague Mr. Roemer of Indiana:

I appreciate the opportunity to testify here today and to discuss the issues of the Next Generation Weather Radar in the National Weather Service modernization plan.

The reason I am here, as is my colleague of Indiana Mr. Souder, is due to the situation I am confident that you are aware of, and Mr. Roemer just spoke about it in his opening statement, the issue of the effect of the modernization plan will have on the ability to detect weather systems and inclement weather in particular parts of this Nation.

As you know, earlier this summer the National Research Council published its "Assessment of NEXRAD Coverage and Associated Weather Services."

The NRC report stated:

"Despite the fact that the NEXRAD provides overall network superiority in areas where the old radar site is relatively distant from the replacement NEXRAD, there may be some degradation in the NEXRAD detection coverage."

Examples of the areas of concern included northern Alabama, northern Indiana, northwestern North Dakota, northwestern Pennsylvania, northeastern Tennessee.

Reviewing further maps in NRC's appendices indicating the difference in the sensitivity between the pre-NEXRAD and NEXRAD networks, it is evident that the pre-NEXRAD network is consistently more sensitive and provided more complete coverage.

Mr. Chairman, it is not my intention to reiterate points in the report of which I know the Committee is fully aware. I am confident the Committee is aware of my concerns and others who may see a degradation of weather radar coverage.

I know that whatever awareness was not gained by the NRC's report, my colleague from Indiana, Mr. Roemer, I am sure has pointed out numerous times to his colleagues on this Committee.

I understand we are waiting for the Commerce Secretary's final report on the issue which is to be released sometime early next month. However, despite that report and the recommendations therein contained, I would like to take this out of the realm of maps, technicalities, and reports.

What I want to share with you is some of the cold realities of the degradation of the weather coverage.

I have attached to my testimony copies of two articles published in newspapers in my District which had the NRC's report not described, which should have raised questions about the effectiveness of the NEXRAD report.

These articles described two bands of thunderstorms and tornados that swept through Rochester, Bourbon, Etna Green, North Manchester, and Plymouth on June 7th, 1995.

They were completely undetected and without any warning.

Now these towns in my District are nowhere near the size of Chicago, New York City, or Los Angeles, but these undetected storms injured numerous people and caused property damage across several counties.

Last year, meteorologists at the NWS office in Indianapolis, which has assumed responsibility for northern Indiana under the new system, failed to detect a tornado that struck West Lafayette killing three people and injuring 62.

This raises obvious concerns among members like myself and Mr. Roemer and Mr. Souder, but especially by those who live in the towns like Rochester, North Manchester, Lafayette, that depend on the National Weather Service.

I am here today to share an idea. I recognize the difficulty of the budgetary constraints that also Mr. Cramer discussed facing this Congress, and I am committed to seeking a cooperative solution, one that may transcend the traditional jurisdictional bounds and one that is both reasonable and fiscally prudent.

On October 4th I wrote a letter, a copy of which is attached to the statement, to the National Weather Service outlining my concerns and requesting the consideration of utilizing the Federal Aviation Administration's Redundant NEXRAD system due to be transferred to the National Weather Service which, "would be used to support the logistical pipeline" to be cited in northern Indiana.

The NWS has indicated these four NEXRAD radars would be used as replacement spares. In my letter I have suggested that such action could save millions of dollars over the acquisition and siting of new NEXRAD systems.

After conversations with GAO, I discovered that the estimate to acquire and modify the FAA dual NEXRAD systems into four single string systems compatible with the NWS radar systems are approximately $8 million.

This is significant considering the cost to acquire a single NEXRAD site which is approximately $5 million. The savings potential of this proposal would be nearly around $12 million.

Most importantly, the NWS has already found an adequate funding solution.

In addition, I ask that consideration be given to siting the system at Grissom Air Force Base in Bunker Hill, Indiana. My motivation is one of fiscal concern.

The base was slated to receive a full NEXRAD unit until the BRAC was released. Grissom was realigned to a Reserve base and, in preparation for the NEXRAD unit, a site survey was completed for the placement of the system at Grissom Air Force Base. as we also the Manning Project and the coverage calculation for the Grissom site.

Now that the BRAC process has been completed and the Grissom Air Force Base has been realigned to a Reserve base, it has a smaller weather unit at the moment and my discussions with the base commander and my contacts with the Air Force have shown no objections.

The base commander welcomes it. And of course operations would be excited to have it.

I have initially discussed this proposal with them and, like I said, they would welcome it.

My bottom line, though, Mr. Chairman, is that I support your efforts in modernization and applaud you.

I would also recommend the purchase of these systems from the FAA and the placement of weather systems, whether it is in South Bend, Fort Wayne, or Grissom, to make this gap coverage be based on sound science and prudent fiscal policy.

Thank you, Mr. Chairman.

[The prepared statement and attachments of Mr. Buyer follow:]

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TESTIMONY OF

CONGRESSMAN STEVE BUYER

BEFORE THE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

COMMITTEE ON SCIENCE

OCTOBER 17, 1995

Chairman Rohrabacher, Members of the Subcommittee, I appreciate the opportunity to appear before you today to discuss the issue of the Next Generation Weather Radar and the National Weather Service's Modernization Plan.

The reason I am here, as is my colleague from Indiana, Mr. Souder, is due to a situation I am confident you are aware of. It is the issue of the effect the modernization plan will have on the ability to detect weather systems and inclement weather in particular parts of this nation.

As you know, earlier this summer, the National Research Council (NRC) published its "Assessment of Nexrad Coverage and Associated Weather Services." The NRC reported:

> "Despite the fact that NEXRAD provides overall network superiority, in areas where the old radar site is relatively distant from the replacement NEXRAD, there may be some degradation in NEXRAD detection coverage. Examples of areas of concern include northern Alabama, northern Indiana, northwestern North Dakota, northwestern Pennsylvania, and southeastern Tennessee."

Reviewing further the maps in NRC's appendices indicating the difference in sensitivity between the pre-NEXRAD and NEXRAD networks, it is evident the pre-NEXRAD network is consistently more sensitive and provided more complete coverage.

Mr. Chairman, it is not my intention to reiterate points in the report which I know the Committee is fully aware. I am confident the Committee is aware of my concerns and others here who may see a degradation of weather radar coverage. I know that whatever awareness was not gained by the NRC's report, my colleague from Indiana, Mr. Roemer, I'm sure has pointed out these concerns.

I understand we are all waiting for the Commerce Secretary's final report on this issue, which is to be released sometime early next month. However, despite that report and the recommendations therein contained, I would like to take this out of the realm of maps, technicalities, and reports. What I want to share with you is the cold realities of a degradation of weather coverage.

I have attached to my testimony, copies of two articles published by newspapers in my district which, had the NRC's report not described, would have raised questions as to the effectiveness the NEXRAD network. These articles describe two bands of thunderstorms and tornadoes that swept through Rochester, Bourbon, Etna Green, North Manchester, and Plymouth on June 7, 1995, completely undetected--without any warning. Now, these towns in my district are nowhere near the size of Chicago, New York City, or Los Angeles, but these undetected storms injured numerous people and caused property damage across several counties.

Last year, meteorologists at the NWS office in Indianapolis which has assumed responsibility for Northern Indiana under the new system, failed to detect a tornado that struck West Lafayette, killing three people and injuring 62. This raises obvious concerns among members like myself, Mr. Souder, and Mr. Roemer, but especially by those who live in towns like Rochester and North Manchester and depend on the National Weather Service.

I am here today to share an idea. I recognize the difficult budgetary constraints facing this Congress and am committed to seeking a cooperative solution. One that may transcend the traditional jurisdictional boundaries. One that is both responsible and fiscally prudent.

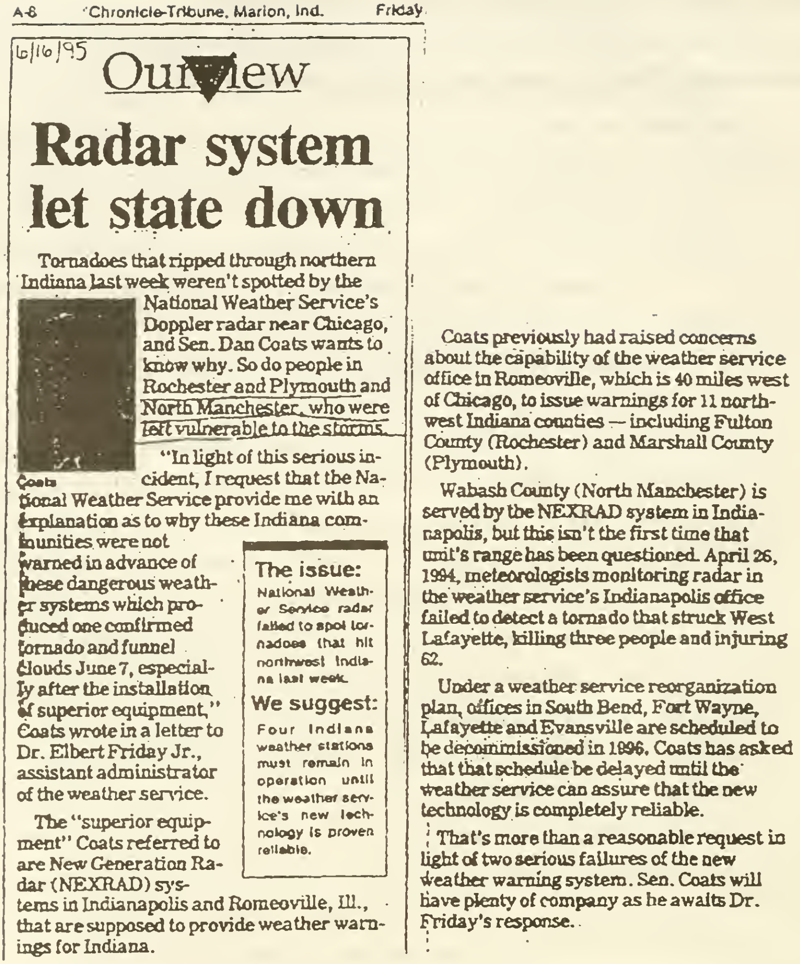
On October 4, I wrote a letter, a copy of which I have attached, to the National Weather Service outlining my concerns and requesting the consideration of utilizing a Federal Aviation Administration redundant NEXRAD system due to be transferred to the National Weather Service which "...would be used to support the logistics pipeline," to be sited in Northern Indiana. The NWS has indicated these four NEXRAD radars would be used as replenishment spares.

In my letter, I have suggested such action could save millions of dollars over the acquisition and siting of a new NEXRAD. After conversations with GAO, I discovered that estimates to acquire and modify the FAA, dual NEXRAD systems into four single string systems, compatible with the NWS radar system, are approximately $8 million. This is significant considering the cost to acquire and site a single, new NEXRAD system is approximately $5 million. The savings potential of this proposal could be nearly $12 million. Most importantly, the NWS has already found an adequate funding solution.

In addition, I asked that consideration be given to siting this system at Grissom Air Reserve Base in Bunker Hill, Indiana. My motivation is one of fiscal concern. The base was slated to receive a full NEXRAD unit until the BRAC was released and Grissom was realigned to a reserve unit. In preparation for the NEXRAD unit, a site survey was completed, manning projected, and coverage calculated for the Grissom site. Now that the BRAC process is complete and Grissom remains a reserve base, with a small weather unit, I believe there is a unique opportunity for additional cost savings.

I have initially discussed this proposal with the Grissom Base Commander, and have contacted the Department of the Air Force. It is my hope that such cooperation can lead to significant cost savings. However, I want to reiterate my primary concern is adequate weather coverage for northern Indiana.

Mr. Chairman, I applaud your efforts and the efforts of this committee for the cooperation in seeking a speedy solution to this very real problem.



A-8 Chronicle-Tribune, Marion, Ind. Friday

6/16/95

Our View

Radar system let state down

Tornadoes that ripped through northern Indiana last week weren't spotted by the National Weather Service's Doppler radar near Chicago, and Sen. Dan Coats wants to know why. So do people in Rochester and Plymouth and North Manchester, who were left vulnerable to the storms.

Coats

"In light of this serious incident, I request that the National Weather Service provide me with an explanation as to why these Indiana communities were not warned in advance of these dangerous weather systems which produced one confirmed tornado and funnel clouds June 7, especially after the installation of superior equipment," Coats wrote in a letter to Dr. Elbert Friday Jr., assistant administrator of the weather service.

The "superior equipment" Coats referred to are New Generation Radar (NEXRAD) systems in Indianapolis and Romeoville, Ill., that are supposed to provide weather warnings for Indiana.

The issue: National Weather Service radar failed to spot tornadoes that hit northwest Indiana last week.

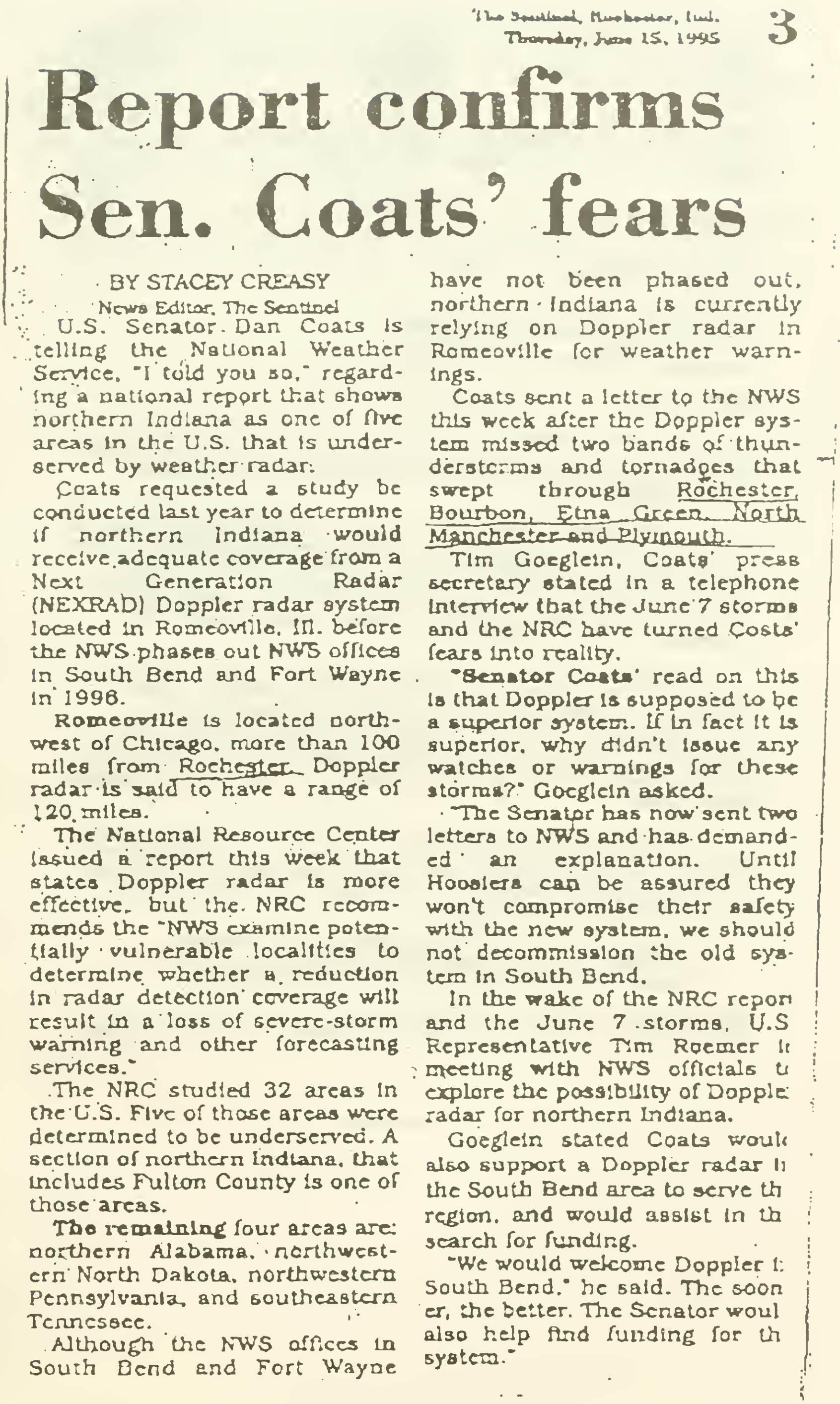
We suggest: Four Indiana weather stations must remain in operation until the weather service's new technology is proven reliable.

Coats previously had raised concerns about the capability of the weather service office in Romeoville, which is 40 miles west of Chicago, to issue warnings for 11 northwest Indiana counties — including Fulton County (Rochester) and Marshall County (Plymouth).

Wabash County (North Manchester) is served by the NEXRAD system in Indianapolis, but this isn't the first time that unit's range has been questioned. April 26, 1994, meteorologists monitoring radar in the weather service's Indianapolis office failed to detect a tornado that struck West Lafayette, killing three people and injuring 62.

Under a weather service reorganization plan, offices in South Bend, Fort Wayne, Lafayette and Evansville are scheduled to be decommissioned in 1996. Coats has asked that that schedule be delayed until the weather service can assure that the new technology is completely reliable.

That's more than a reasonable request in light of two serious failures of the new weather warning system. Sen. Coats will have plenty of company as he awaits Dr. Friday's response.



The Sentinel, Rochester, Ind.
Thursday, June 15, 1995 3

Report confirms Sen. Coats' fears

BY STACEY CREASY
News Editor, The Sentinel

U.S. Senator Dan Coats is telling the National Weather Service, "I told you so," regarding a national report that shows northern Indiana as one of five areas in the U.S. that is underserved by weather radar.

Coats requested a study be conducted last year to determine if northern Indiana would receive adequate coverage from a Next Generation Radar (NEXRAD) Doppler radar system located in Romeoville, Ill. before the NWS phases out NWS offices in South Bend and Fort Wayne in 1996.

Romeoville is located northwest of Chicago, more than 100 miles from Rochester. Doppler radar is said to have a range of 120 miles.

The National Resource Center issued a report this week that states Doppler radar is more effective, but the NRC recommends the "NWS examine potentially vulnerable localities to determine whether a reduction in radar detection coverage will result in a loss of severe-storm warning and other forecasting services."

The NRC studied 32 areas in the U.S. Five of those areas were determined to be underserved. A section of northern Indiana, that includes Fulton County is one of those areas.

The remaining four areas are: northern Alabama, northwestern North Dakota, northwestern Pennsylvania, and southeastern Tennessee.

Although the NWS offices in South Bend and Fort Wayne have not been phased out, northern Indiana is currently relying on Doppler radar in Romeoville for weather warnings.

Coats sent a letter to the NWS this week after the Doppler system missed two bands of thunderstorms and tornadoes that swept through Rochester, Bourbon, Etna Green, North Manchester and Plymouth.

Tim Goeglein, Coats' press secretary stated in a telephone interview that the June 7 storms and the NRC have turned Costs' fears into reality.

"**Senator Coats**' read on this is that Doppler is supposed to be a superior system. If in fact it is superior, why didn't issue any watches or warnings for these storms?" Goeglein asked.

"The Senator has now sent two letters to NWS and has demanded an explanation. Until Hoosiers can be assured they won't compromise their safety with the new system, we should not decommission the old system in South Bend.

In the wake of the NRC repor and the June 7 storms, U.S Representative Tim Roemer i meeting with NWS officials t explore the possibility of Dopple radar for northern Indiana.

Goeglein stated Coats woul also support a Doppler radar i the South Bend area to serve th region, and would assist in th search for funding.

"We would welcome Doppler i South Bend," he said. The sooner, the better. The Senator woul also help find funding for th system."

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SUBCOMMITTEE:
CRIME

October 4, 1995.

Mr. Elbert "Joe" Friday
Director
National Weather Service
National Oceanic and Atmospheric Administration
14th and Constitution
Washington, D.C. 20230

Dear Mr. Friday:

I am writing in response to my concerns with the National Weather Service's (NWS's) modernization plan. More specifically, these concerns arise from the National Research Council's (NRC's) study, entitled Assessment of NEXRAD Coverage and Associated Weather Services.

As you are aware, the NRC review of adequacy of NEXRAD coverage concluded that the planned network coverage will substantially improve weather services on a national basis. However, in five specific areas where the pre-NEXRAD radar service will be replaced by a NEXRAD some distance away, there is a potential for some degradation in radar detection capability. The study reports that one of those five identified areas is Northern Indiana. A substantial portion of the district I represent, Indiana's Fifth Congressional District, is included in this area.

After several conversations with the NWS, NRC, and the Government Accounting Office (GAO), I have learned the NWS is intending to acquire two FAA WSR-88D NEXRAD systems which the FAA recently designated in their redundant system configuration, located in Grand Turk and Georgetown, Bahamas. These two dual-NEXRAD systems, may be modified to single string systems to be compatible with the NWS radar system and would provide four additional NEXRAD radars. They would be provided at significant cost savings, which the NWS states "...would be used to support the logistics pipeline."

Estimates to acquire and modify the dual NEXRAD systems are approximately $8 million. I understand this is significant considering the cost of a new NEXRAD system, which would include siting, installation and acceptance costs, is approximately $5 million. It is important to note that the NWS has already found an adequate funding solution. NWS recommends the purchase of these systems:

> "...would be obtained by delaying the contract award for its planned UPS/shelter system...This budget revision would result in a delay in the completion of the UPS/shelter program by approximately 3 years."

Acknowledging the fact that the modifications and siting of these radars are estimated at around $3.4 million, the savings potential of this acquisition could be near $12 million.

PRINTED ON RECYCLED PAPER

While the NWS is considering these radars be used as replenishment spares to support the logistics pipeline, I respectfully request that consideration be given to siting one of these NEXRAD systems, after modification, in Northern Indiana. My request is based on confirmation that the NWS modernization plan would potentially degrade radar detection capability.

In addition, I request specific consideration be given to siting this system at Grissom Air Reserve Base, Bunker Hill, Indiana. While I support finding any acceptable site, the fact that Grissom already has a weather unit and a completed site survey for a NEXRAD siting could result in even greater cost savings.

It is my understanding that the final NRC study, including recommended adjustments, is due to be submitted to Congress sometime around November 5, 1995. I look forward to this report and appreciate full consideration of this request. Please direct any questions or concerns to me or my Legislative Assistant, Scott Linn, in my Washington office. Thank you.

Best regards,

Steve Buyer

Steve Buyer
Member of Congress

SB:sl

cc: Honorable Richard Lugar
Honorable Dan Coats
Honorable Mark Souder
Honorable Tim Roemer

Mr. ROHRABACHER. We appreciate your testimony.

My staff will be happy to meet with you and representatives of the National Weather Service Forecast to discuss your idea, as you provide that leadership.

Mr. BUYER. Thank you, Mr. Chairman.

Mr. ROHRABACHER. Call that meeting and my staff will be very happy to participate in those meetings with you.

Mr. BUYER. Thank you.

Mr. ROHRABACHER. And thank you for your very thoughtful testimony. I apologize to the Committee for I did not know that you and Congressman Gekas were in the middle of a markup. Otherwise I would have basically asked you to testify immediately.

Mr. Gekas, would you like to proceed, with Mr. English's permission?

STATEMENT OF THE HONORABLE GEORGE W. GEKAS, A REPRESENTATIVE IN THE CONGRESS OF THE UNITED STATES FROM THE 17TH DISTRICT OF THE COMMONWEALTH OF PENNSYLVANIA

Mr. GEKAS. Yes. I will ask my colleague on the Judiciary Committee to tell them down there I am thinking of them. I am really thinking of them.

[Laughter.]

Mr. GEKAS. Mr. Chairman, Members of the Committee:

It is almost significant that the gentleman from Indiana left, because I was going to say to him that in the action on the Floor last week we incorporated into the bill, with the chairman's acquiescence and with the Full Chairman's acquiescence, a measure that would go to his concern.

That is, to inquire into the feasibility of having piggyback efforts with the FAA radar systems into the gaps that have been created by the modernization effort.

So I am hoping that when you have this little conference you will invite me and I will show you the text of what already has been incorporated into the bill, and that will be helpful to all of us as we seek to go forward with modernization and not expend one extra penny in installation of systems, by simply piggybacking, as we propose, and as is now part of the bill.

At the outset of my main testimony I would also ask that the Chair accept my written statement and the attachments for the record.

Mr. ROHRABACHER. Yes. Without objection.

Mr. GEKAS. All I want to do is to add to the record another piece of evidence of the gaps about which we speak.

In the part of Pennsylvania to which I refer, as in which there is a significant gap, contains three of the best known communities in the world. I say that advisedly.

Harrisburg, because of the Three Mile Island incident, unfortunately, is known in Afghanistan and Pakistan and every place else in the world.

Hershey, Pennsylvania, from whence comes Hugs and Kisses, and are known to everybody in the world.

And, believe it or not, the best known community in this corridor is Williamsport. Why? Because every kid in the universe who plays baseball longs to go there for the Little League World Series.

All of these communities are bound up in the NEXRAD system that overshoots them, from Williamsport overshoots Hershey and Harrisburg, and as the anecdotes that we have attached will indicate, completely miss significant weather events that have occurred and which we will provide evidence that have occurred.

So what we want the Committee to know is the existence of the gap, which is part of the reason that we are here; and, secondly, to take into account the possibility that we can use the FAA at least for the time being, and perhaps on a permanent basis until this Committee and the Congress as a whole will decide in better and more costly, unfortunately, ways to fill those gaps.

That is the extent of my testimony, and I thank the Chair and the Committee for its indulgence.

[The prepared statement of Mr. Gekas follows:]

GEORGE W. GEKAS
17TH DISTRICT, PENNSYLVANIA

COMMITTEE ON THE JUDICIARY

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THE HONORABLE GEORGE W. GEKAS TESTIMONY BEFORE THE HOUSE SCIENCE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT ON THE NEXT GENERATION WEATHER RADAR

October 17, 1995

Mr. Chairman, since the National Weather Service (NWS) first began its mission to modernize our national weather forecasting capabilities with the Next Generation Weather Radar (NEXRAD) system, I contended that Harrisburg, Pennsylvania would experience degradation of service due to the permanent closing of the pre-NEXRAD station located in Harrisburg, and the new NEXRAD station being located a considerable distance away in State College, Pennsylvania.

Throughout the implementation process of the NEXRAD system by the NWS, serious concerns were raised regarding deficient coverage of the Harrisburg metropolitan area. Unfortunately, my concerns were repeatedly rebuffed by the NWS with claims that Harrisburg weather coverage was appropriate. I am here before this Committee unconvinced of this finding.

My conviction is based on the fact that the new NEXRAD station located in State College is approximately 115 miles north of the Harrisburg metropolitan area. The NWS has estimated that Harrisburg is approximately 75 miles away from the new NEXRAD station. However, the NWS fails to acknowledge that the actual site of the radar is 15 miles north of State College, on Rattlesnake Ridge in Black Moshannon State Park. According to the NWS's radar training manual, this added distance would measure the NEXRAD radar beam at 16,000 feet above Harrisburg, completely missing the city. The natural elevation of the NEXRAD radar beam is approximately 10,000 feet due to the earth's curvature. However, when taking into account the added elevation due to the mountain location of the NEXRAD radar, compounded with the Susquehanna River Basin's significant valley demotion, the radar gap is enlarged. Unfortunately, these facts have been consistently disregarded by the NWS.

Page Two: Hon. George W. Gekas

I would like to bring to the Committee's attention a significant finding by the National Research Council (NRC) in their report "Assessment of NEXRAD Coverage and Associated Weather Services". The NRC has reported that "Degradation of detection capability might occur where the pre-NEXRAD radar is decommissioned and coverage is provided by a NEXRAD located some distance away." (p.31) Based on this finding, I contend that Harrisburg, Pennsylvania will experience degradation of service.

Physical limitations of the NEXRAD radar beam have left open an unmonitored area which is densely populated and prone to flooding. As further evidence of my case I submit to the Committee the enclosed sampling of documented cases illustrating severe weather conditions which went undetected by the NEXRAD system.

Unfortunately, while some areas of the country may enjoy improved radar services, Central Pennsylvania has seen diminished service due to the lack of attention to this flaw in the NEXRAD coverage. I believe the most significant responsibility entrusted to the NWS is to ensure the public's safety. I urge the Committee to consider this situation which the NWS has created and direct them to rectify degradation of weather forecasting service.

I thank the Chairman for this opportunity to testify and I hope that this information will help reconcile those imperfections in the NEXRAD system, particularly for the City of Harrisburg.

Mr. ROHRABACHER. Mr. Gekas, you will be invited to whatever meeting we have on this. I would like to compliment you on the leadership that you have provided on this issue already.

As you say, you have already initiated action on the Floor to try to make sure that these health and safety issues are taken care of in a very cost-effective manner.

I appreciate that leadership, and you will be invited to each and every meeting we have on this.

Mr. GEKAS. I thank you.

Mr. ROHRABACHER. Thank you, sir.

Mr. English?

STATEMENT OF THE HONORABLE PHIL ENGLISH, A REPRESENTATIVE IN THE CONGRESS OF THE UNITED STATES FROM THE 21ST DISTRICT OF THE COMMONWEALTH OF PENNSYLVANIA

Mr. ENGLISH. Thank you, Mr. Chairman.

I would like to thank you and the Committee for this opportunity.

I would also seek unanimous consent to spread my full testimony onto the record, along with appropriate attachments.

Mr. ROHRABACHER. Yes.

Without objection.

Mr. ENGLISH. Mr. Chairman, the implementation of the National Weather Service modernization has raised serious concern regarding the quality and timeliness of Weather Service in northwestern Pennsylvania.

Tourism based on the use of Lake Erie is our region's number one industry, and boaters and other lake recreation depend on accurate weather reports when planning their activities.

Public safety officials depend on them to issue timely warnings.

However, the pending closure of the Erie Weather Station forces our section of America's north coast to rely on distant radar coverage which the National Research Council has described as "potentially inadequate."

Potentially inadequate due to the unpredictability of low-lying lake-driven weather patterns, dangerous weather patterns which can easily creep unnoticed on the horizon of distant radar.

Furthermore, the GAO has questioned the effectiveness of the National Weather Service plans for the region. Not surprisingly, these reports have caused considerable local alarm, a concern that I share, regarding the continued viability of our region's largest employer and the continued provision of public safety.

Under the current plan, the existing Erie Weather Service office will be replaced with radar service provided by NEXRADs located in Cleveland, Ohio; Pittsburgh; and Buffalo, New York.

Local supplemental observers will assist the automatic surface observing systems as planned in efforts to meet the new modernization plan.

In meetings with concerned constituents, as well as through reading the National Research Council's Assessment of NEXRAD Coverage and Associated Weather Services, I believe that this arrangement will increase the probability of weather-related accidents.

The NRC identified the Eric Region as one of five U.S. areas where NEXRAD coverage would be inadequate under the planned deployment.

The NRC report states:

"This area has a region-specific, low-altitude weather phenomena, lake-effect snow, that is difficult to detect with NEXRADs located in Cleveland, Buffalo, and Pittsburgh.

The pre-NEXRAD radar in this region was able to detect lake-effect snow within approximately 110 kilometers of the existing radar site. Other locally occurring low-altitude phenomena that may have degraded radar-collection coverage includes many super cells and macro bursts."

In more simple English, the distant radar stations do not operate as well as the local one. People in my district have complained that rain or snow shown by the local radar is most often not shown on Cleveland or Pittsburgh NEXRAD radars.

A local volunteer weather watch group called "Skywarn" noted that removing the Erie Weather Service personnel has resulted in the percentage of weather warnings that were verified as accurate declining from over 80 percent to less than 30 percent.

The most serious consequence of this degradation is that the public receives warnings for weather that never occurs. Like the moral of "Peter and the Wolf," I am troubled by the emergence of an apathetic public that will eventually ignore a real warning.

Finally, based on a report sent to me by a coalition of community leaders, I remain unimpressed by what will replace the local weather office.

I have examined the Weather Service Erie had and compared it with what we will receive, and I am not convinced that the region, which includes parts of New York and Ohio as well, is safe.

Distant radar does perform as well as local?

The ASOS system designed to complement the NEXRAD is not functioning as planned.

Professional staff is being replaced with subcontractors with less experience.

When one reviews the situation and adds Lake Erie's unpredictability and its effect of producing unusual and difficult-to-predict weather phenomena, I believe we could have a very serious problem.

Mr. Chairman, I appreciate this panel's efforts to review these local situations where NEXRAD's network obviously is not following through and has the potential to create a degradation.

I would also like to thank our local community leaders who have been an enormous resource to my office in providing information on the ground on the impact of these changes.

[The prepared statement of Mr. English follows:]

October 17, 1995

Testimony of
the Honorable Phil English
before
the House Science Committee

I would like to thank Chairman Rohrabacher and the Members of the Science Subcommittee on Energy and Environment for allowing me the opportunity to speak at this hearing which will explore the National Weather Services (NWS) current plans for providing Next Generation Weather Radar (NEXRAD) coverage for the United States.

The implementation of the NWS modernization has raised serious concern regarding the quality and timeliness of weather service in Northwestern Pennsylvania. Tourism based on the use of Lake Erie is our region's number one industry. Boaters and other lake recreaters depend on accurate weather reports when planning their activities and public safety officials depend on them to issue timely warnings. However, the pending closure of the Erie Weather Station forces us to rely on distant radar coverage which the National Research Council has described as potentially inadequate -- due to the unpredictability of low-lying, lake-driven weather patterns -- dangerous weather patterns which can easily creep unnoticed under the horizon of distant radar. Furthermore, the GAO has questioned the effectiveness of National Weather Service plans for the region. Not surprisingly, these reports have caused considerable local alarm -- a concern I share -- regarding the continued viability of our region's largest employer and the continued provision of public safety.

Since the 1980s, the National Weather Services has embarked on a modernization and restructuring of its operations and associated field office structure. The cornerstone of this NWS modernization is the NEXRAD, an enhanced radar system. Their plan calls for the replacement of the 128 obsolete radars with a combination of 22 operational Department of Defense (DOD) NEXRADs and 116 operational NWS NEXRADs which will be deployed in the contiguous United States. Combined with geostationary meteorological satellites (GOES I-M) and an advanced computer/telecommunications system, the NEXRADS will assist the NWS in creating a substantially improved weather service on a national basis. The technological leap also allowed for a decrease in operational expenses and size. But, I want to express my grave concern that the consolidation degrades the weather service provided to my community in Northwestern, Pennsylvania.

The present Erie Weather Service Office will be replaced with radar service provided by NEXRAD's located in Cleveland, Ohio, Pittsburgh, and Buffalo, New York. Furthermore, local "supplemental observers" will assist the Automated Surface Observing Systems (ASOS) as planned in efforts to meet the NWS modernization plan. In meetings with concerned constituents as well as through reading the National Research Council's (NRC) Assessment of NEXRAD Coverage and Associated Weather Services, I believe that this arrangement will increase the probability of weather-related accidents.

The NRC identified the Erie region (Northwestern, PA, Southwestern, NY, and Northeastern, OH) as one of five U.S. areas where NEXRAD coverage would be inadequate under the planned deployment. The NRC report states: "This area has a region-specific, low altitude weather phenomenon (lake-effect snow) that is difficult to detect with NEXRADs located at Cleveland, Ohio; Buffalo, New York; and Pittsburgh, Pennsylvania. The pre-NEXRAD radar in this region was able to detect lake-effect snow within approximately 110 km of the existing radar site. Other locally occurring low-altitude phenomena that may have degraded radar-detection coverage includes mini-supercells and macrobursts." In more simpler English, the distant radar stations do not operate as well as the local one. People in my district have complained that rain or snow shown by the local radar is most often not shown on the Cleveland or Pittsburgh NEXRAD radars.

A local, volunteer weather-watch group, Skywarn noted that removing the Erie Weather Service Personnel has resulted in the percentage of weather warnings that were verified as accurate declined from over 80% to less than 30%. The most serious consequence of this degradation is that public receives warnings for weather that never occurs. Like the moral of Peter and the Wolf, I am troubled by an emergence of an apathetic public that will eventually ignore a real warning.

Finally, based on a report sent to me by a coalition of community leaders, I remain unimpressed by what will replace the local weather office. Following the NWS modernization plan, NWS designed and deployed the ASOS to replace local observations. However, as far back as 1983, a NOAA report (NOAA PA/93058), noted ASOS could not automatically report on 31 critical elements, such as tornadoes, thunderstorms, or blowing snow. Furthermore, a recent GAO report (GAO/AIMD-95-81) concluded that ASOS continued to contain many serious problems, such as the inability of six of the eight sensors not meeting key performance specifications. Reacting to this shortfall, the NWS have supplemental observers to continue the accuracy needed for an effective system. While they are certified, they do not have the training and experience of the professionals they replaced.

I have examined the weather service Erie had and compared it with what it will receive and I am not convinced that the region is as safe. Distant radar does perform as well as local. The ASOS system designed to complement the NEXRAD is not functioning as planned. Professional staff is being replaced with subcontractors with less experience. When one reviews the situation and adds Lake Erie's affect of producing unusual and difficult to predict weather phenomena, I believe we could have a serious problem.

In line with my expressed concern, Rep. Bud Cramer successfully advocated an amendment to retain current provisions of law that prohibit the Weather Service from closing local weather stations unless it certifies that any closure would not result in a degradation of service. I believe this amendment was necessary and its passage prompted my support for the bill. In 198?, citizens of Northwestern Pennsylvania experienced the savagery of foul weather when tornados ripped through Crawford and Mercer Counties. People in my district need to know that they can be secure.

In closing, I would like to especially thank Erie County Councilperson Mrs. Joy Greco, Franklin Township Supervisor David Henderson and the SOS (Save Our Station) coalition for their assistance with my testimony and to thank again the Science Committee for allowing me to present my testimony. I would also like to present the committee with a submissions from the SOS coalition and from Mercer County FEMA Coordinator Carl M. Black, Jr.

Mr. ROHRABACHER. Mr. English, thank you for your testimony, and especially your personal observations as to the level of service you are getting today and with the new system coming in, because obviously you are right on the scene.

Although I get reports secondhand, you are right there.

So we appreciate you bringing your observations, your personal observations, directly to the Committee.

We will be, as with the other Members of the panel, when we have some sessions with the National Weather Service to try to talk about solutions here and making sure that the solutions are being implemented, your on-the-scene observations will be even more important and we will appreciate your participation.

Mr. ENGLISH. Thank you, Mr. Chairman.

Now my old friend from California, Mr. Herger.

STATEMENT OF THE HONORABLE WALLY HERGER, A REPRESENTATIVE IN THE CONGRESS OF THE UNITED STATES FROM THE 2ND DISTRICT OF THE STATE OF CALIFORNIA

Mr. HERGER. Thank you very much, Mr. Chairman, and Members, for the opportunity to testify before your subcommittee on the important issue of Weather Service modernization.

To begin, I wish to join in expressing my strong support for Mr. Cramer's amendment to H.R. 2405, which restored the "no degradation of service" standard for the Weather Service office closures under the modernization plan.

As you know, I have grave concerns regarding the potential impact the proposed closure of the Redding office in my District will have on the counties I represent.

Mr. Chairman, I want to stress that the most important issue we confront at this hearing today is public safety. I strongly favor consolidating and reducing big government.

However, I must oppose those initiatives that do so at the risk of human life and safety.

Modernization and consolidation of the Weather Service is a good goal. However, despite assurances by the Weather Service, the current modernization plan has a few gaping holes that leave several regions, including the area north of Redding, in Northern California, inadequately covered and exposed to disaster.

This risk of public safety is unacceptable to me. I hope it will also be unacceptable to this subcommittee.

Mr. Chairman and Members, Redding lies at the far north of the Sacramento River Valley near the base of Shasta Dam, the largest reservoir in the Central Valley Project of California.

Interstate 5, the primary western overland route between Alaska and Mexico, runs through Redding. This stretch of freeway between Redding and the Oregon border is subject to severe and hazardous storms.

To the north, east, and west of Redding are mountain ranges which accumulate hundreds of inches of snowpack each winter and have been the source of storms that, in recent months, have caused some of the worst flooding in California history.

They also contain eight national forests that have experienced some of the most devastating wildfires in our state's history over the last decade.

Mr. Chairman, and Members, the unique geography and weather conditions surrounding Redding are critical to the issue of whether closing the Redding office will in fact degrade weather service to the region.

The radar coverage maps provided by the Weather Service give the impression that the radars in Eureka, Medford, Reno, Sacramento, and Beale Air Force Base, would provide adequate coverage to the whole of northern California making a Weather Service office in Redding seem unnecessary.

However, in reality the radars in Eureka, Medford, and Reno simply cannot see through the mountains, and the radars at Sacramento and Beale are too far away to provide adequate coverage north of Redding.

Consequently, closure of the Redding office would leave much of the area north of Redding exposed to disaster due to inadequate radar coverage and the lack of experienced local forecasters.

Travelers along Interstate 5 would be in jeopardy of not receiving timely and accurate weather advisories. Local authorities would be less able to respond quickly to flood and snow conditions.

Federal authorities would be less able to coordinate releases from Shasta Dam during the seasons of heavy rain. Fire fighters would have less accurate and timely weather information to protect them when battling wild fires.

Mr. Chairman, these conditions are by definition a degradation of service.

In my numerous communications with the Weather Service, the Administration, and Members of Congress, I have urged repeatedly that a NEXRAD be placed in Red Bluff just to the south of Redding.

A radar at this location would be able to see up the Interstate 5 corridor and pick up much of the precipitation that is regularly missed by more distant radars.

It would also provide more accurate forecasting for fire and flood control.

Mr. Chairman, a radar in Red Bluff could perhaps justify closure of the Redding office. Without such an accommodation, however, the Weather Service must continue to operate the Redding office in order to comply with the law and established policy on public safety.

Mr. Chairman and Members, I strongly urge this Committee to favorably consider these recommendations. Also, with the permission of the Subcommittee, I would like to submit for the record a number of letters and statements from individuals and organizations in my District.

Again, I thank you for this opportunity to testify.

[The prepared statement of Mr. Herger follows:]

U.S. House of Representatives
Committee on Science
Subcommittee on Energy and Environment
The Honorable Dana Rohrabacher, Chairman
October 17, 1995

Statement of the Honorable Wally Herger

Thank you, Mr. Chairman, for the opportunity to testify before your Subcommittee on this important issue. As you know, I have grave concerns regarding the potential impact the proposed modernization of the National Weather Service will have on northern California and particularly the counties that I represent.

To begin, I wish to express my strong support for the amendment to H.R. 2405 offered last week by Mr. Cramer of Alabama. As you know, Mr. Chairman, this amendment restored, in modified form, the requirement that the Weather Service certify to Congress that no degradation of service will result from the closure of any of its weather stations. Presently, the Weather Service plans to close its Redding office in my district some time after 1997. I strongly believe this would cause a degradation of service that would be disastrous for northern California. My beliefs are fortified by the public comments that I will submit for the record today, many of which provide credible, scientific evidence affirming the points that I will make.

Mr. Chairman, I want to stress that the most important issue we are confronted with at this hearing today is public safety. Although I strongly favor nearly every effort to consolidate and reduce big government, I must oppose those that do so at the risk of human life and safety. Despite assurances by the Weather Service, the current modernization plan has a few gaping holes that leave a number of regions, including the area north of Redding, inadequately covered and exposed to disaster. This risk to public safety is unacceptable to me. I hope it will also be unacceptable to this Subcommittee.

Mr. Chairman, let me briefly describe the geography surrounding Redding for the Subcommittee. Redding lies at the far north of the Sacramento River Valley, near the base of Shasta Dam, the largest reservoir in the Central Valley Project, and one of the principal sources of water in the Sacramento and Central Valleys. Running through Redding is Interstate 5, the primary Western overland route between Alaska in the north and Mexico in the south. The mountainous portion of this interstate between Redding and Medford, Oregon is subject to severe storms that make travel hazardous.

To the north, east and west of Redding are mountain ranges reaching heights of 11,000 feet. These mountains accumulate hundreds of inches of snowpack each winter and have been the source of severe storms that, in recent months, have caused some of the worst flooding in California history. They also contain eight national forests and some of the richest timber resources in the state and in the country. These forests have been prone in the last decade to some of the most devastating wildfires in our state's history. Last year, many of the fires that consumed over 375,000 acres of forest land in California burned in these mountains.

Mr. Chairman, this geography is critical to the issue of whether the closure of the Redding office will, in fact, degrade weather service to the region. If we simply look at the coverage maps provided by the Weather Service, it appears that the NEXRADS in Eureka, Medford, Reno, Sacramento and Beale Air Force Base will provide adequate coverage to the whole of northern California, making a weather service office in Redding seem unnecessary. However, when geography is considered, the reality is that the radars in Eureka, Medford and Reno simply can't "see" through the mountains and that the radar facilities in Sacramento and at Beale Air Force Base are too far away to provide adequate coverage north of Redding. In view of these facts, it becomes clear that closing the Redding office will unavoidably result in a degradation of service.

In my numerous communications with the Weather Service and members of Congress over the last several months, I have urged repeatedly that a NEXRAD be placed in Red Bluff, just to the south of Redding. A radar in Red Bluff would be ideally located to "see" up the Interstate 5 corridor and pick up much of the precipitation that is regularly missed by more distant radars. If a radar were placed in Red Bluff, closure of the Redding office could, perhaps, be justified. Without such accommodation, however, the Weather Service must continue operating the Redding office in order to comply with the law and established public safety policy.

Mr. Chairman, let me briefly outline a few of the services that the Redding office has provided to northern California. These service provide a measurement of the degree to which coverage will be degraded should the office be closed.

Flood Forecasting

In March of this year, floods ravaged all ten counties in my district, leaving each a federal disaster area. During this tragedy, the weather service office in Redding provided critical up-to-the-minute information to local governments, enabling them to react almost instantaneously to individual emergencies. This team work saved countless lives and mitigated millions of dollars in property damage. Furthermore, it enabled Federal officials to control water releases from Central Valley Project dams, thereby avoiding further destruction downstream. Significantly, during this emergency the NEXRAD in Sacramento, which provided the primary coverage for Redding, failed to adequately detect precipitation north of Redding where most of the flood waters originated. Had it not been for the efforts and cooperation of experienced Weather Service personnel in Redding, who were able to compensate for the shortcomings of the radar coverage, the devastation in my district and other areas throughout the Sacramento Valley could have been much worse.

Wildfire Forecasting

The Redding Weather Service Office is housed in the same facility as the Forest Service, Bureau of Land Management and California Department of Forestry. Over the last 30 years, these agencies have worked closely together to provide critical weather information to firefighters throughout northern California. As we learned from last year's tragedy in Colorado which killed 14 firefighters, sudden changes in weather can cause wildfires to quickly change course and claim lives. Last year wildfires ravaged the forests of northern California in the worst fire season since 1987, destroying over 375,000 acres of forest and threatening to burn entire communities. During this crisis, the Redding office worked closely with the Federal and state fire fighting authorities to provide timely forecasts to firefighters on the ground. The familiarity of Weather Service staff with the operations of the fire fighting agencies enabled them to act quickly and effectively in pressure situations.

I have been informed by the Weather Service that, upon closure of the Redding office, all wildfire forecasting for northern California will be handled out of Boise, Idaho. I simply cannot see how a more distant fire forecasting center with often conflicting dispatching priorities, will be able to provide a better service to firefighters in California. I do not want us to have another Colorado experience before we realize the value of a local fire forecasting office with local expertise.

I-5 Corridor

Interstate 5 is the preferred north-south route of motorists and truckers year-round. These motorists rely on accurate weather forecasting for safe passage through potentially treacherous stretches of freeway. The freeway between Redding and the Oregon boarder is one of these. Winter storms along this corridor can dump as much as two feet of snow overnight. Spring rains can drop several inches of rain in a matter of hours. Local authorities must react to adverse weather situations almost instantaneously in order to mobilize snow removal equipment and issue timely travel advisories. Because of the failure of existing NEXRADS to adequately measure precipitation along the corridor, the experience of meteorologists has been invaluable and has helped avert disaster on several occasions. Closure of the Redding office would remove these local experts and place winter and spring travelers along the corridor at an unacceptable risk.

Mr. Chairman, in conclusion, I wish to reemphasize that the issue before us is public safety. We have already made a strong statement in favor of public safety by reinstating the "no degradation of service" standard to the Weather Service modernization plan. I now urge this subcommittee to take additional steps to prevent the ill-advised closure of important weather service centers, like the Redding office, and thereby ensure adequate weather coverage to northern California and other vulnerable regions throughout the country. Thank you.

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
P O. BOX 496073
REDDING, CA 96049-6073
TDD (916) 225-3464
TELEPHONE: (916) 225-3426
Phone: (916) 225-3477

September 19, 1995

The Honorable Ron Brown
Secretary of Commerce
Department of Commerce
14th Street, between Constitution Ave.
and "E" Street, NW
Washington, D.C. 20230

Dear Honorable Brown:

Need for NEXRAD in Redding, California

I am writing to you to express my support for the installation of NEXRAD in Redding, California, and to oppose any reduction of services at the Redding National Weather Service Office.

The California Department of Transportation (Caltrans), District 2, has responsibility for maintenance of all State highways, Interstate freeways and U.S. highways in seven northeastern California counties. Our district is largely mountainous and subject to severe winter storms.

The west coast's primary north-south transportation route, Interstate 5, passes through Redding and continues north through rugged mountains in Shasta and Siskiyou Counties before continuing north into Oregon and Washington. Interstate 5 is a vital interstate commerce and tourist route that when restricted or closed due to winter storms can have a negative impact on west coast industry and commerce.

As the Department responsible for snow removal operations, Caltrans relies very heavily on weather forecasts from the National Weather Service in Redding. The Redding office currently provides specific forecasts for the Redding/Red Bluff and the Mount Shasta/Yreka areas. On a daily basis, decisions are made with regard to storm staffing levels, chemical deicing applications, and public information announcements based in part upon information received from the National Weather Service in Redding.

Our responsibility to provide a high level of service to the traveling public means that we must have accurate, timely and reliable weather forecasts. Further, in this time of diminishing resources necessary to accomplish our mission, it is imperative that we use new technologies to enhance our ability to serve the traveling public in an efficient manner.

In closing, I believe that the National Weather Service should in no way diminish the services provided at the Redding office and, further, should increase the level of service provided by installing NEXRAD in Redding.

Sincerely,

E. F. POCH
District Director
District 2

cc Michael Warren, City Manager, City of Redding

WALLY HERGER
2ND DISTRICT CALIFORNIA
PLEASE REPLY TO
☐ WASHINGTON OFFICE
2433 RAYBURN HOUSE OFFICE BUILDING
(202) 225-3076
DISTRICT OFFICES
☐ 55 INDEPENDENCE CIRCLE SUITE 104
CHICO, CA 95926
(916) 893-8363
☐ 410 HEMSTED DRIVE, SUITE 115
REDDING, CA 96002
(916) 223-5898

COMMITTEE ON
WAYS AND MEANS

COMMITTEE ON
THE BUDGET

Congreſs of the United States
House of Representatives
Washington, DC 20515–0502

August 1, 1995

The Honorable Ronald Brown
Secretary of Commerce
U.S. Department of Commerce
Washington, D.C. 20230

Dear Secretary Brown:

I write to express my deep concern regarding two issues of great importance to residents of my northern California District. First, I have serious reservations regarding the "privatization" of agriculture and fire weather forecasting within the National Weather Service (NWS). Second, I remain concerned about your pending recommendation to Congress on the "National Implementation Plan for Modernization of the National Weather Service."

The President's FY96 budget recommended the "privatization" of both the agriculture and fire weather services. This proposal has subsequently been adopted by both the House Appropriations Subcommittee on Commerce, Justice, State and Judiciary and the House Science Subcommittee on Energy and the Environment in their respective appropriating and authorizing bills. These legislative provisions have relied on assurances by NWS Director, Elbert W. Friday, that "private meteorologists can successfully manage these...programs being transferred to them, ensuring that the nation receives the full benefit of available weather information from both the weather service and the private sector."[1]

I have serious reservations regarding the Director's statement. I know of no private forecasting service, for example, that is either willing or able to assume the fire weather service functions that will be discontinued in the Redding Weather Service Office (WSO) on October 1. Furthermore, should a private entity step forward to provide this service, I am concerned that it will be able to do so with the same degree of effectiveness that has been provided by the NWS.

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[1] U.S. Department of Commerce, National Oceanic and Atmospheric Administration press release, July 5, 1995.

NWS meteorologists have developed a close working relationship over the last 30 years with the fire dispatchers from the Forest Service, Bureau of Land Management, California Department of Forestry, and other federal and state officials who share the same physical facilities with the NWS in the Redding WSO. This close, synergetic working situation has been instrumental in heading off many North State wildfires throughout the years and keeping countless smaller fires from spreading out of control. My fear is that, upon discontinuation of fire weather service in Redding, the success of our fire suppression efforts in northern California will be severely compromised.

Based on this and other concerns, I request that the NWS identify for me those private meteorologists in the Redding area which are both willing and able to assume the agriculture and fire weather service posts that are slated for termination. Furthermore, in the event that the NWS is unable to identify any such private entities, I request a briefing on the ameliorative measures the NWS intends to take in the Redding area to ensure that the removal of these services will not impose undue hardship on agricultural producers and fire suppression teams in the area.

On a separate matter, I wish to, once again, re-emphasize my concerns about your forthcoming recommendation to Congress on the implementation of the Next Generation Weather Radar (NEXRAD) system.

As you know, the National Research Council recently concluded an assessment of NEXRAD coverage with regard to the terms of the "no degradation of service" requirement of Public Law 102-567 (NRC Report). This report concluded the following:

> * In areas where the old radar site is relatively distant from the replacement NEXRAD, there may be some degradation in NEXRAD detection coverage
>
> * Weather services are influenced by the full complement of observations and products available to the forecaster, as well as by cooperative spotter networks and the skills of experienced forecasters. The performance of this composite system is the critical element in assessing whether areas that have degraded radar-detection coverage will also have a degraded quality of weather services. Such assessments need to include a much more in-depth technical analysis for these areas and locations where there are radar coverage concerns than has been the case to date.[2]

---

[2] NRC Report, pp. 44-45.

The NRC Report also cited several evaluation procedures which should be followed to determine the capability of the composite system as part of the overall determination of service degradation to specific areas. These include the following:

* The characteristics of local weather phenomena;

* Radar coverage and terrain features;

* Data quality and availability;

* Local spotter network and the user community;

* Adequacy of communications within the composite system and with users.[3]

These conclusions and evaluation procedures suggest to me that current plans to provide no additional radar coverage to northern California and to eventually close the Weather Service Office in Redding would both perpetuate distance-related radar coverage problems and disturb the overall capability of the composite system, thereby unavoidably degrading services to the area.

As residents of the Redding community and I have pointed out in previous communications with the NWS, radar coverage along the I-5 corridor has historically been inadequate. This was particularly evident during the floods which ravaged the area in the spring of this year. Because of the unique terrain and unusual weather patterns in the region, the NEXRAD in Sacramento, by the admission of its own technicians, grossly underestimated precipitation in the North State on more than one occasion.

Given the continued erratic weather conditions north of Redding and the inability of the Sacramento NEXRAD to adequately "see" north of Redding, it seems self evident that, at the very least, the NWS would continue operation of the Redding WSO to avoid degrading services to the region. A more appropriate measure would be to install a NEXRAD north of Sacramento that would adequately cover the vulnerable I-5 corridor.

I strongly urge that, during your final deliberations in the weeks ahead, you will fully apply the conclusions and recommendations of the NRC Report. I further urge that you again consider the mountains of evidence that have been presented regarding the inadequacy of current weather coverage to the I-5 corridor. I am confident that, in so doing, you will recommend appropriate measures to Congress that will adequately safeguard the lives and property of North State residents.

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[3] NRC Report, p. 42.

Thank your for your consideration of these most important matters. I look forward to your reply.

Sincerely,

Wally Herger

WALLY HERGER
Member of Congress

WH/tt

THE SECRETARY OF COMMERC
Washington, D.C. 20230

AUG 25 1995

The Honorable Wally Herger
House of Representatives
Washington, D.C. 20515-0502

Dear Congressman Herger:

Thank you for your letter regarding two issues of concern in northern California: "privatization" of specialized weather services and our pending recommendation to Congress on the National Research Council's (NRC) Assessment of NEXRAD Coverage and Associated Weather Services.

Regarding the first issue, President Clinton's budget proposal for fiscal year 1996, the House Science Committee Authorization, and the House Commerce, Justice, State Appropriations Subcommittee, all include reductions in National Weather Service (NWS) funding. These reductions will result in the privatization of non-wildfire weather services to non-Federal users. However, meteorological support directly related to all wildfire suppression activities will continue. This support includes presuppression forecasts, National Fire Danger Rating System Forecasts, fire weather watches, red flag warnings, spot forecasts for wildfires, incident response, and fire-weather training for fire fighters. Therefore, our intention at this time is to continue fire weather services as outlined above in Redding until we finalize our plans for fire weather services in California in the modernized and restructured NWS.

The budget proposals for fiscal year 1996 also include a reduction in funding resulting from privatization of the NWS agricultural weather program. Under these proposals, the NWS will cease to provide specialized forecasts, including fruit frost forecasts, to the agricultural community. Elimination of this program will reduce the NWS funding level by $2.3 million.

I have attached a Directory of Private Weather Services in answer to your concerns on the availability of private weather forecasting companies in northern California that can provide adequate support to the agricultural and fire weather communities. As a Government agency, the NWS cannot endorse specific companies or individuals. However, the companies in this directory were obtained from professional societies, such as the American Meteorological Society. Furthermore, the private meteorological sector of our economy generates an estimated $200 million in annual revenue. I endorse Dr. Friday's statement in your letter that the Nation's private meteorologists can successfully manage the agriculture weather programs being transferred to them.

Regarding the second issue, I appreciate your interest in the NRC's study, particularly as it relates to the Redding, California, area. A team of experts from within the Department of Commerce has already started to apply the criteria developed by the NRC to all 32 identified areas of concern, including Redding. This team's effort will be the basis of my report to Congress later this fall. In finalizing my report, I will consult with the Modernization Transition Committee, a Federal advisory committee established by Public Law 102-567 to represent users of weather services.

The NWS is working with the U.S. Air Force to ensure that the Department of Defense NEXRADs, such as the Beale Air Force Base NEXRAD, will function as a fully committed element of the national radar network, operating with the same standards, quality, and availability as the NWS-operated radars. As you indicated, any assessment of potential "degradation of services" must include more than just radar coverage. The type and quality of all weather services provided will be considered and carefully assessed in compliance with Public Law 102-567 before any conclusions are made in regard to the Redding Weather Service Office.

Sincerely,

Ronald H. Brown

Ronald H. Brown

Enclosure

Testimony of Supervisor Francie Sullivan, Shasta County California
before the
Energy and Environment Subcommittee
Science Committee
U.S. House of Representatives

October 17, 1995

My name is Francie Sullivan. I am a Shasta County Supervisor, representing the eastern half of the county. The proposal to privatize the Fire and Agriculture Weather Service is of great concern to people in this area.

Three years ago a forest fire burned one hundred square miles (64,000 acres) in thirty six hours less than one half hour from my home. It burned three hundred homes and it burned enough timber to build fifty five thousand homes. The fire suppression costs alone exceeded twenty million dollars. Fires such as this are becoming common as the fuel loads build. Prescriptive burns are crucial to any effort to ward off catastrophes such as the Fountain Fire. Unless every effort is made to encourage impacted land owners to reduce unnecessary fuel on the ground, the fires will continue to burn. And since forty percent of Shasta County is federally owned land every tax payer in America has an interest in those fires. The annual cost ($490,000) of the Fire Weather Service is less than the cost of one days fire suppression on a major fire. At this time there are no private meteorologist in this area to provide this service. And we are at the peak of our fire season.

The economy of Shasta County has always been based on our natural resources. What makes our county so breathtakingly beautiful are the tree covered mountains, the lakes, the cattle grazing on green pastures, the huge open fields It also makes it possible for us to see where our food grows. Most of our farms, and in fact, our timber operations, are family run. Many of our ranches have hydro plants or R.V. parks or members who works "in town" so that they can afford a lifestyle they love. Adding what may be a very expensive meteorologist to the budget will put some of them out of business. We don't have the economy of scale to, perhaps, even attract private weather services to this area. Our biggest cash crop is strawberry plants which we ship all over the world. We're also famous for our bees and our wild rice. These are crops that are very dependent on current accurate weather forecasts.

The privatization proposal calls for the services to be continued for federally owned lands. With the checkerboard patterns of ownership in northern California this makes the benefits of privatizing questionable. And if the staff will have to be maintained to provide the service for federal lands where will the savings be generated.

Thank you for giving me the opportunity to comment.

City of Redding

September 20, 1995
A-090-100-935

The Honorable Ronald Brown
Secretary of Commerce
U.S. Department of commerce
Washington, D.C. 20230

Dear Secretary Brown:

The NRC report not only fails to address the issues raised by the Redding Task Force, but is a series of faulty conclusions based on erroneous data.

The City of Redding provided a map, at considerable expense, detailing true radar coverage above ground level in the Northern Sacramento Valley. The map used in the NRC report, and provide by the Weather Service, purports to show radar coverage at 10,000 feet above the site of the radar. This is a misleading statement that obscures the true height of the center of the radar beam where radar echoes will be detected. In figure 1, note that the radar antenna is at the surface of the earth and the center of the beam is 5.4 km or 17,717 feet above the earth at 240 km or 130 nm. When you add the initial height of the radar above the earth's surface, the 10,000 ft. coverage stated in the Weather Service's map is well below the center line of the radar.

In the case of the Medford, Oregon radar, which is located on Mt. Ashland at 7523 feet, the center of the radar beam would be 19,523 feet over Redding. This is calculated under standard atmospheric refractive conditions and with the minimum antenna elevation of 0.5 degrees.(fig.2)

The Reno radar is also on a mountain at an elevation of 8367 feet and approximately the same distance from Redding. Under the same standard refractive conditions and with the same 0.5 elevation angle the center of the radar beam would be 20,367 feet.(fig.2)

The Eureka radar, which is situated near the coast at an elevation of 2400 feet requires an antenna elevation angle of 2 degrees to clear the numerous mountains greater than 5000 feet that are within 20 to 25 miles of the antenna. Since Redding is approximately 95 miles from this site, the center of the radar beam would be 28,400 feet above Redding. (fig.2)

OCT 13 1995

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It becomes patently obvious that the purpose of the Weather Service map entitled "**NEXRAD COVERAGE OF CALIFORNIA AT 10,000 FT.**" (fig.3) is to mislead the people into believing the NEXRAD coverage will be adequate for the issuance of watches and warnings to safeguard life and property in the north state. Nothing is further from the truth. The only echoes these radar's will detect are those that extend above 20,000 feet. That means only summertime thunderstorms are detectable by the current radar's, and even these thunderstorms will be only partially scanned; the intense lower level (fig 1), and possibly flash flood producing section of the storm, will be well below the radar beam.

The Beale AFB radar alone will provide some coverage of the north valley, but even this will be inadequate, as it will not scan the upper reaches of the Sacramento Canyon and will be blocked from scanning the northeast plateau. Add to this the fact that the radar is dedicated to Air Force purposes and not Weather Service; plus by the admission of the Area Manager, Norman Hoffman, there will be no additional staffing at Sacramento to monitor the extra Beale PUP unit that will be installed in the Sacramento office.

Under the old system there were two radar's - Medford and Sacramento - that we knew provided very limited coverage of the north state, but at least we had a staff of meteorologists at Redding who knew the region and were able to issue the required warnings. Under the reorganization there will be no office at Redding and only a marginal increase in radar coverage because of the Beale radar.

Under these conditions we are asked to believe that the new radar's, scanning at 20,000 feet and above; and the Beale radar with a quantitative stratiform precipitation range somewhere near 60 nm; will provide information to meteorologists in Sacramento who will then issue warnings. to the north state.

This system will not provide the information required, and the north state will not be provided the timely watches and warnings needed to safeguard life and property.

Before we leave the radar coverage question I would like to call your attention to the radar situation as it existed prior to the installment of NEXRAD. In figure 4, the upper panel shows the placement of the WSR-57, WSR-74S, and the WSR-74C sites in the contiguous United States. From this map you can see there were three WSR-57's and six WSR-74C's in the west.

Now look at the lower panel. It is obvious the West has gained radar coverage, but what is not so obvious is the loss of weather stations the west has sustained because of the assumed better radar coverage. NEXRAD coverage should not be equated to No Degradation of Service: especially when the radar coverage is above 20,000 feet. This method of evaluation that uses the radar coverage before and after NEXRAD, obviously favors the Mid-west, the South and the East.

This past year water releases from Shasta and Keswick Dams were, at times, the maximum allowable by law; 79,000 cfs at Keswick and 68,221 cfs at Shasta. The situation downstream from the dams was hazardous, and only a delay in storm arrival and less than the forecast amount of precipitation, prevented a major disaster. Even so, there were numerous flooding events in the north state during the winter and spring months and none were detected by the current radar network.

In fact Redding, and other places in the north state, have for years contended with heavy rains and flood events that went un-detected by the old radar system. At present we have no reason to expect any different scenario with the current placement of the new NEXRAD. The north state needs a dedicated NEXRAD. When the Redding Weather Office closes there will be a very significant degradation of service to the entire north state. Watches and Warnings cannot be issued without good observations and local meteorologists to interpret those observations. We need a NEXRAD and a local weather office. Without them we are a open to disaster.

Sincerely,

Robert C Anderson

Robert C. Anderson
Chair, NEXRAD Task Force

Enclosures

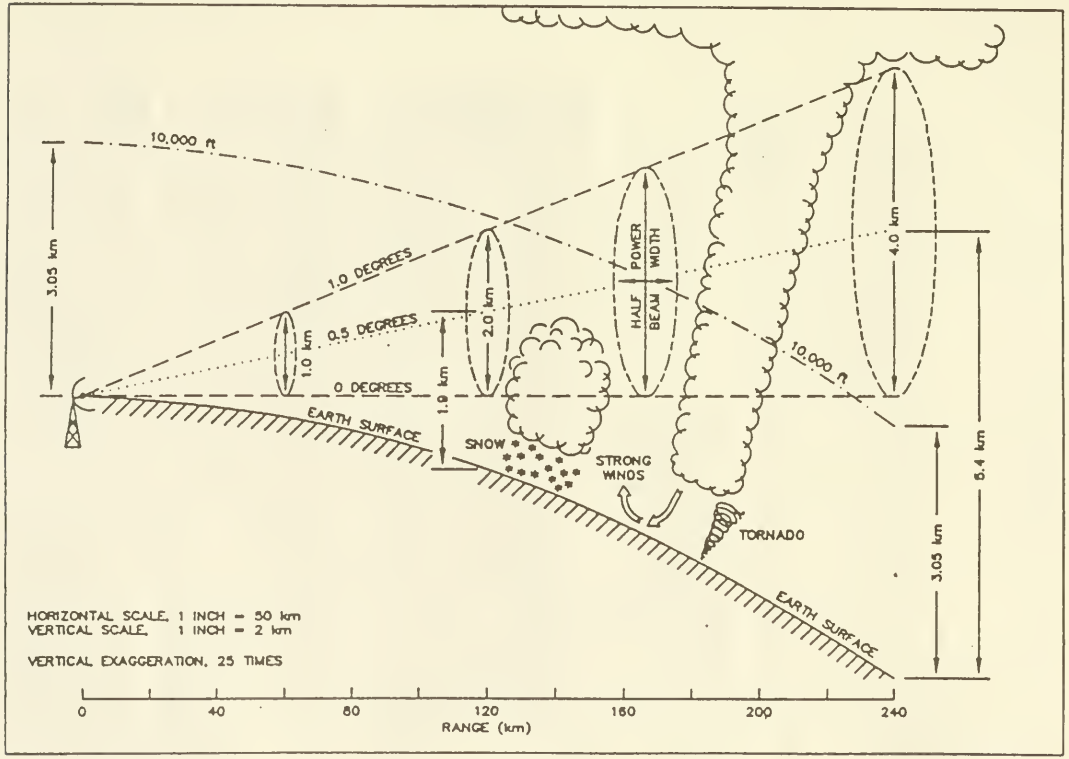


Figure A-3 Diagram illustrating the effect of range and earth curvature (with standard atmospheric refraction) on NEXRAD cross-beam resolution and coverage of low-level weather phenomena. Courtesy of SRI International.

Figure 1.

We have established [illegible] if the Earth had no atmosphere [illegible] (homogeneous atmosphere), the radar beam would be a straight line tangential to the Earth's surface. Because we do have an atmosphere, the rate of curvature of the radar beam relative to the earth is a function of 1) the curvature of the Earth's surface and 2) the N-gradient. Under standard atmospheric conditions, the radar beam has a radius of curvature which is greater than that of the Earth's surface. This produces a radar beam which gains height with range.

If the antenna on the surface is pointed horizontally, the distance of the beam center above a spherical Earth as function of distance and elevation angle can be approximated. *Figure 18 charts beam centerline heights under standard atmospheric conditions.*

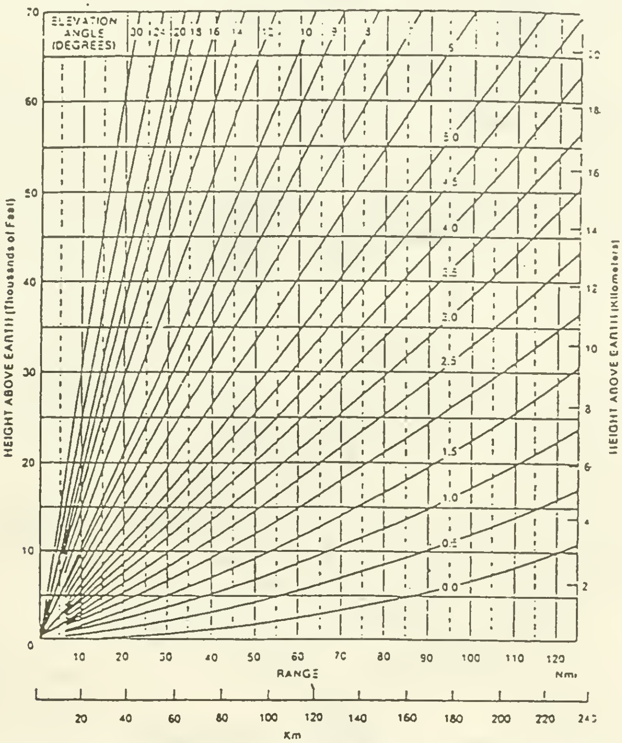
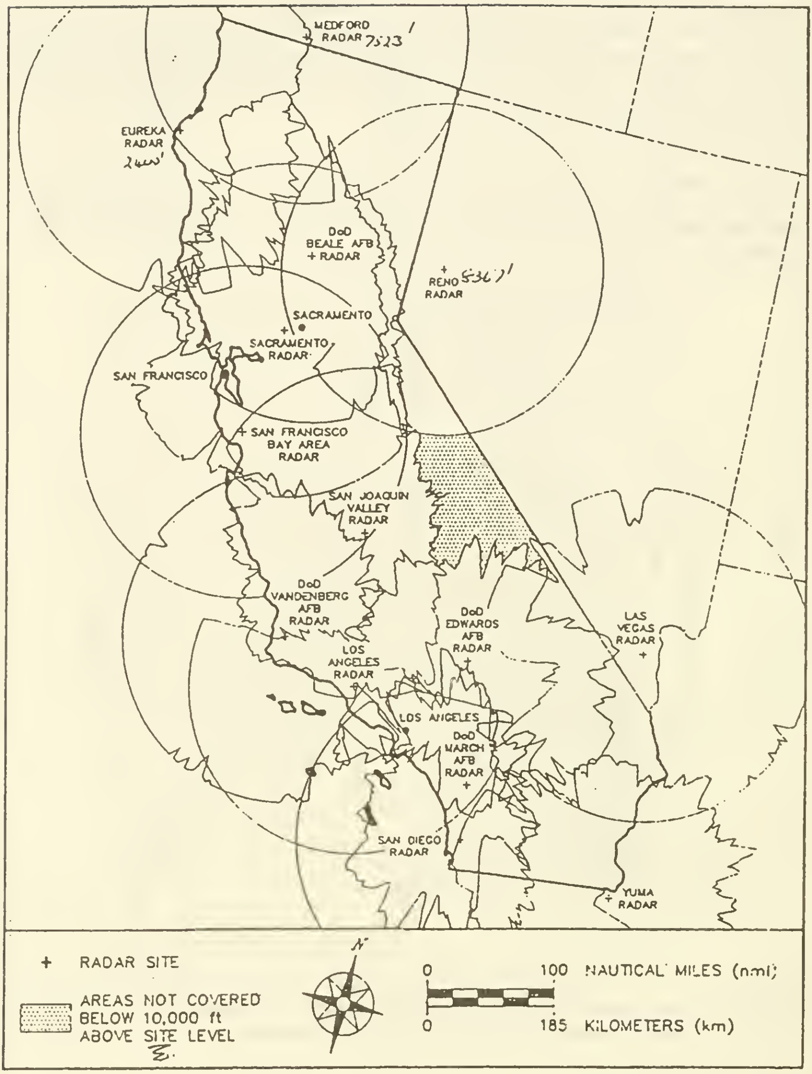


Figure 18. Beam centerline height for various ranges as a function of elevation angle under standard atmospheric refractive conditions.

Figure 2.

10-30-9



NEXRAD COVERAGE OF CALIFORNIA AT 10,000 ft ?

Figure 3.

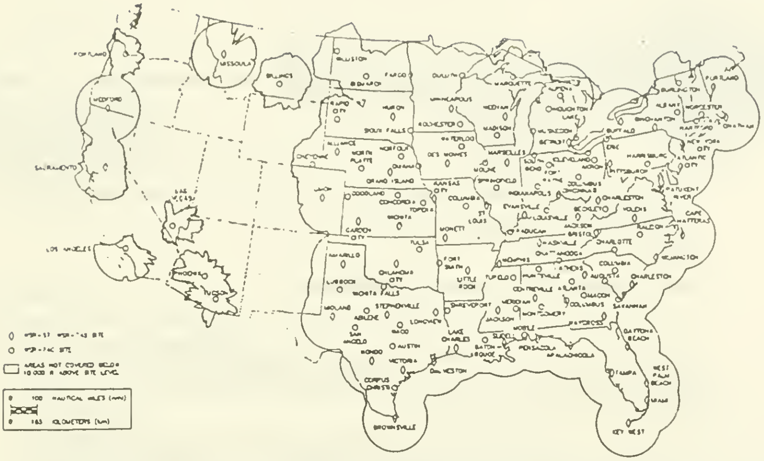

WSR-57, WSR-74S SITE
WSR-74C SITE
AREAS NOT COVERED BELOW 10,000 ft ABOVE SITE LEVEL
0 100 NAUTICAL MILES (nm)
0 185 KILOMETERS (km)

Figure 2-1a Composite pre-NEXRAD coverage at 10,000 ft above site level for the contiguous United States and the locations of the radars by type. Courtesy of SRI International.

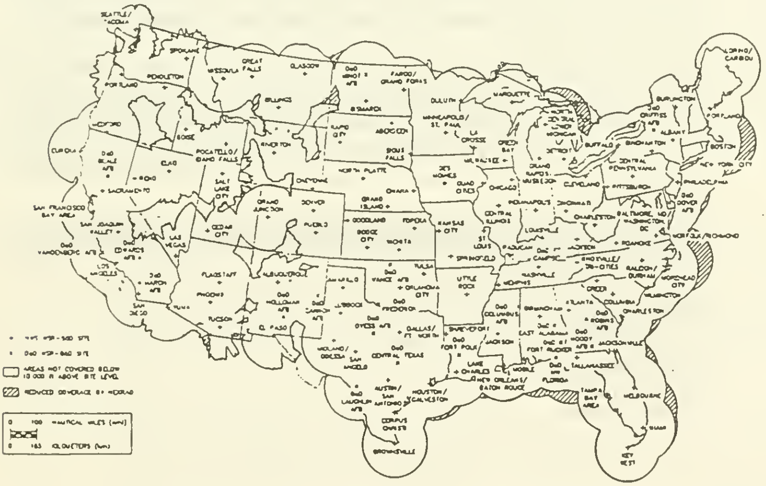

NWS WSR-88D SITE
DoD WSR-88D SITE
AREAS NOT COVERED BELOW 10,000 ft ABOVE SITE LEVEL
REDUCED COVERAGE BY NEXRAD
0 100 NAUTICAL MILES (nm)
0 185 KILOMETERS (km)

Figure 2-1b Composite NEXRAD coverage at 10,000 ft above site level for the contiguous United States and the locations of NWS and DoD sites. This figure also shows those areas (striped blue) where there will be reduced coverage at 10,000 ft by the NEXRAD network compared with that which existed with the pre-NEXRAD network, as specified in P.L. 102-567, Sec. 702(4). Courtesy of SRI International.

Figure 4

SHASTA COUNTY
BOARD OF SUPERVISORS
1815 Yuba Street, Suite 1
Redding, California 96001
(916) 225-5557
(800) 479-8009
(916) 225-5189-FAX

RICHARD DICKERSON, DISTRICT 1
IRWIN FUST, DISTRICT 2
FRANCIE SULLIVAN, DISTRICT 3
MOLLY WILSON, DISTRICT 4
PATRICIA A. "TRISH" CLARKE, DISTRICT 5

September 19, 1995

Hon. Ronald H. Brown, Secretary of Commerce
U. S. Department of Commerce
Fourteenth Street and Constitution Ave., N.W.
Washington, D.C. 20230

Subject: Support for Shasta County's local Weather Station

Dear Secretary Brown:

We are again writing to request your assistance in our efforts to assure that Shasta County's weather services not be "degraded" as the result of modernization plans of the National Weather Service. Apparently there is now a proposal afloat to "privatize" the weather service, a concept which simply would not work in our area.

For the past three or four years the County of Shasta, Cities of Redding, Anderson and Shasta Lake, and representatives of community industries have worked together to secure a NEXRAD radar installation and to retain the local offices of the National Weather Service. A 38-member NEXRAD Task Force was formed, including local elected officials.

A degraded weather service would adversely affect an area of 17,400 square miles (much larger than the state of Maryland), with a scattered population of nearly half a million people. The geographical area is unique in that its weather varies widely, as does its topography, from valley floors at sea level to mountains of 11,000 feet. Many of the valleys are of moderate climate, while the more rugged areas have violent weather swings.

The lack of well-coordinated local weather coverage would pose a threat to fire fighting capability, fire prevention, air-ambulance services, and responses to natural disasters such as last winter's severe flooding. In that instance, the local weather bureau was in hourly contact with our Emergency Services Division, which kept FEMA costs down. If the proposed "privatization" were to take place, the various service agencies (Cal/Trans, CDF, U.S. Forest Service, City and County Public Works/Roads, etc.) would still require taxpayer-funded weather service. There is also the potential economic impact of the closure of the main north-south route on the West coast (Interstate 5) due to the inability to predict extreme storm conditions.

The bottom line is that we are strongly opposed to the proposal to "privatize" the weather service. We believe that this function is best managed by government. This is a matter of public safety, and an appropriate use of taxpayer dollars.

Sincerely,

IRWIN FUST, Chairman
Board of Supervisors
County of Shasta

IF/FS/cbr/nexrad.995

REDDING
MEDICAL
CENTER

September 18, 1995

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

Redding Medical Center operates a twin engine helicopter and a twin turbine Cessna Conquest to transport ill patients as part of our community's air ambulance service. We transport 600 to 700 critically ill patients annually from remote locations and small hospitals.

Currently, pilots receive real time weather for our local area through the Flight Service Station in Red Bluff from 6:00 a.m. until 10:00 p.m. daily, and from the Redding National Weather Service 24 hours a day. If the Redding weather station closes, pilots would have no way to get accurate weather conditions for this area during the hours that the Red Bluff FSS is closed. The Red Bluff FSS is scheduled for closure in 1995. This would result in our inability to ascertain any weather conditions below 10,000 feet.

If this weather station is closed, the following issues would negatively impact our ability to provide safe air ambulance service for the following reasons:

1. Redding Medical Center's helicopter service flies under Federal Aviation Regulation (FAR) Part 135 day and night. These regulations require pilots to obtain real time weather conditions and forecasts for each patient flight when flying under Instrument Flight Regulation (IFT).

   Without the Red Bluff and Redding FSS, we would be unable to transport in adverse weather conditions. Now, due to FSS assistance, we are consistently updated regarding weather conditions which enables us to select the appropriate route, resulting in a safe journey for flight crew and patients.

50th
ANNIVERSARY
1945-1995

PO Box 496072
1100 Butte Street
Redding, California 96049-6072
916/244-5400

2. If the Redding and Red Bluff FSS are closed, the only weather conditions available for our medical flight service would be from Sacramento, Eureka, Medford, etc., which provide weather conditions above 10,000 feet and of no benefit to 95 percent of our flights.

3. Without precise weather information, there will be times that the aeromedical pilot may refuse a critical patient flight because of perceived bad weather. The flight may have been scheduled had accurate weather information been available from a local weather station.

Flight safety and our ability to continue serving our community's health care needs will be seriously jeopardized without the ability for the pilots to get real time weather information for our local area.

Sincerely,

Steve Corbeil
Chief Executive Officer

ky

City of Redding

DAVID A. KEHOE
Mayor

September 18, 1995
A-090-100-935

The Honorable Ron Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street between Constitution
Avenue and "E" Street, NW
Washington, D.C. 20230

Dear Secretary Brown:

The City of Redding wishes to reiterate its support, along with many other interested parties in this region, for NEXRAD and the local office of the National Weather Service. Additionally, from a local government perspective, it is clear that this is a vital government service in an area where services cannot be duplicated by the private sector.

In December, 1994, a delegation from the Redding area presented material in Washington D.C. to various officials of the National Weather Service, the U.S. Congress and the White House regarding the impacts which we believed were most damaging to this region should the National Weather Service modernization plan go forward as announced. It appears that the impacts have not been recognized and, thus, we are requesting your assistance on this issue.

It is a supreme irony that a worthwhile, well-founded plan for modernizing the National Weather Service should have inherent in its content a degradation of service to this region. An area of the size of the State of Maryland essentially will be without the benefits of NEXRAD even the benefits of a local weather station if the modernization plan goes forward. This is due to the fact, which we have stressed on many occasions in the past, that the topography of this region, with mountains surrounding the Redding and environs, is such that weather phenomenon lower than 10,000 to 15,000 feet in this valley may be essentially undetected by NEXRAD, if the installation is not appropriately located. We have demonstrated clearly in the past that the installation on the coast and the one in Oregon as well as the one in Nevada simply do not cover this valley and that the Beale Air Force Base installation is inadequate to cover this region, both because it has a military mission and is poorly located with respect to its ability to "see" up the valley, where significant weather phenomenon originate.

We respectfully reemphasize our point that there will not be adequate service for agriculture, water management, flood control, and fire interests, air ambulance service, commercial and general aviation and that some of these shortcomings literally represent matters of life and death.

760 PARKVIEW AVENUE, REDDING, CA 96001-3396 • P.O. BOX 496071, 96049-6071 • (916) 225-4000

Secretary of Commerce
NEXRAD Issue
Page 2

We are most concerned that this fact will not become evident until the local weather station is eliminated and that the NEXRAD installation is irrevocably located at a less-than optimum site. We believe that the Congressional mandate to ensure that there will be no degradation in service is not being met, and the attached report bears additional witness to that significant flaw in the plan.

On behalf of the many concerned interests of this region, we urge reconsideration of the National Weather Service plan for modernization as it pertains to this region, and we sincerely hope that a more appropriate plan will be developed that satisfies the intent of Congress. We pledge our cooperation in working toward a constructive solution to this problem.

Very truly yours,

David A. Kehoe

David A. Kehoe
Mayor

D:\MAYOR\BROWN.NEX

Ms. Helen L. Couser
P.O. Box 22
Whitmore, CA 96096-0022

September 18, 1995

Mr. Ronald H. Brown
Secretary of Commerce
Fourteenth Street
Washington, D.C. 20230

Dear Secretary Brown:

The decision to remove the National Weather Service (NWS) from Redding, California is an unwise decision for many reasons:

#1. This leaves a very large area of Northern California (17,400 square miles) without the advisory services not covered by NEXRAD.

#2. A potential life threatening situation that will affect the general economy of the Northern region, already reeling from disastrous cutbacks in the lumber industry, including other economic downturns to smaller businesses and hospitals.

#3. Federal and State air attack units, essential to fighting wildland fires, fly out of Redding Municipal Airport, the present location of NWS.

#4. Agriculture interests have a high degree of concern over the potential loss of the local weather station.

#5. Shasta Dam was built by the Federal Government assisted by Bureau of Reclamation and NWS to provide flood control and water supplied to much of California.

#6. We must pursue the location of a NEXRAD unit to serve this region where it can "see into the Sacramento canyon area.

#7. A location on the coast or in Nevada will not suffice: radar does not go through mountains.

#8. Interstate commerce, a concern of your office, will also be adversely affected by the loss of NWS at Redding Municipal Airport.

#9. Both Interstate 5 and the railroad service which all from Seattle to San Diego, pass through a "choke point" in the Northern Sacramento Valley at altitudes that produce snow and adverse weather.

#10. California Department of Transportation and California Highway Patrol, Mercy Medical Center, Redding Medical Center, without weather information is the difference between life and death. The two combined hospitals fly 1,500+ air ambulance missions a year.

I respectfully ask your office to look into this situation. Are the objectives of the Clinton administration being served by the National Weather Service? It is not wise to alienate the whole of Northern California. Northern California needs and must have the local NWS. Northern California and surrounding mountainous states need the President's leadership in this matter.

Very truly yours,

Helen L. Couser

Helen L. Couser

Superior California Economic Development District
Modoc • Shasta • Siskiyou • Trinity
737 Auditorium Drive, Suite A • Redding, CA 96001 • (916)241-8720 • FAX:(916)241-1712

September 15, 1995

Honorable Roy Brown
Secretary of Commerce
14th Street between Constitution
  Avenue and "E" Street, N.W.
Washington, D.C. 20230

Re: Retention of U.S. Weather Bureau Office and Installation of NEXRAD

Dear Mr. Secretary:

Please accept this letter as our notice of strong support in favor of retention of the Weather Bureau Office in Redding and installation of a Next Generation Radar (NEXRAD).

The Redding area is the primary commercial center for all of Northern California and it only makes sense to retain the existing weather station at the present location. Accurate and timely weather reporting in the local area is crucial for this major transportation center, especially for highway freight travelling on northern routes from Redding. Interstate 5 through Redding is the primary transportation route north out of California. With Redding being the major medical center for all of Northern California and parts of Southern Oregon and relying very heavily on air transportation, a local, accurate and timely weather report and forecast is crucial as well. Northern California agricultural and timber industries rely on accurate weather reporting for cultural and harvesting operations. This is especially crucial for planning timber harvesting operations in which soil compaction and erosion in inclement weather conditions can be extremely detrimental. Also in nursery strawberry plant harvesting, the ability to obtain current and timely weather forecast information is extremely important for planning harvesting operations of this multi-million dollar industry in Northern California.

This is not to trivialize the importance to other local communities that may be considered as alternate locations for the Weather Bureau Office and NEXRAD, however, from an economic consideration, the most benefit from local industry can be obtained from the present central location in the Redding area. Further, it makes no sense to set-up a new office when the Bureau has an existing office already located in Redding.

Honorable Roy Brown
Secretary of Commerce
September 15, 1995
Page 2

Again, as an economic and business development organization in Northern California, we strongly support retention of the existing Weather Bureau Office and installation of NEXRAD at the present existing location.

Sincerely,

Robert Nash
Executive Officer

RN/bl
C:NEXRAD

CITY OF SHASTA LAKE

September 15, 1995

The Honorable Ron Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street between Constitution
Avenue and "E" Street, NW
Washington, D C. 20230

Dear Mr. Secretary

The City of Shasta Lake is located north of Redding, California, on Interstate Highway 5. Shasta Lake is adjacent to Shasta Dam which is the cornerstone of the Central Valley Project. Shasta Dam controls storm run-off and stores water for irrigation and municipal uses, as well as low summer flow salmon migration flows, for the Sacramento basin and points as far south as Los Angeles In addition, the City is located on the main transportation route between California, Oregon and Washington The City, then, is located on one of the most strategic routes for interstate commerce and safe travel

It has come to our City Council's attention that the plans to install Next Generation Radar (NEXRAD) stations have been revised to privatize the weather system. Shasta Lake could be adversely affected by such a plan, especially since the rural mountainous northern California area cannot be expeditiously provided with such a private enterprise service.
The travelers and tourists that are so important to our economy in Northern California, now that the timber products enterprise has been crippled by the new forest harvest and environment regulations, require year-round weather forecasts, and current weather alerts from a local weather station that will accurately monitor our micro-climatic weather patterns.

The City of Shasta Lake continues to support the appropriate use of taxpayer dollars to provide a NEXRAD station in close proximity to Shasta Lake, Redding, Anderson, or Red Bluff for the benefit of all I must reiterate the importance of the Shasta Lake area to the water supply, flood control, and transportation systems through-out the State of California

Finally, the Redding Airport, the only major airport north of Sacramento, is an extremely important cog in the economic growth of Northern California It would be another setback to the area to have the weather service removed or relocated to the detriment of the airport.

I urge you to support appropriate residents, travellers, and tourists protection through proper Northern California weather service in our micro-climatic locale

Sincerely,

Ronald G Young

Ronald G Young,
City Manager

SHASTA COUNTY CATTLEMEN'S ASSOCIATION
P.O. Box 492401
REDDING, CALIFORNIA 96049-2401

August 31, 1995

Honorable Ron Brown, Secretary
U.S Department of Commerce
Washington, DC 20230

Dear Secretary Brown:

We are very concerned about the continued threat of closing the Redding, California Weather Station since it is so important to this area

It is vital for us in the livestock industry to have accurate weather forecasting. Weather knowledge is extremely important in planning livestock feeding operations, birthing time management programs, and transportation schedules. Knowledge of forthcoming weather can and does assist greatly in reducing livestock losses from inclement weather.

The Redding Weather Station is important in interstate commerce, as there are great numbers of livestock moving back and forth between Northern California and Oregon, and to a lesser extent Nevada, Idaho and Washington. The terrible weather that occurs through the mountains surrounding Redding can be very damaging and can be forecast much more reliably with a local weather station.

We have also observed that accurate weather forecasting has been extremely beneficial to the Sheriff's Department in preparing for disasters before they occur. We know also that the U.S. Forest Service and the California Department of Forestry and Fire Protection can more adequately protect our lands and public lands from disastrous wildfires when adequate localized weather information is available.

We strongly urge that you do whatever may be necessary to keep the Redding Weather Station in operation

Respectfully yours,

Bradd McDannold, President

BM WJ cld

c U.S Senator Diane Feinstein
U.S Representative Wally Herger

City of Redding

CITY COUNCIL
Robert C. Anderson, Mayor
Patricia A. Anderson
David A. Kehoe
David L. McGeorge
Ken Murray

January 18, 1995
A-090-100-935

Ms. Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

As you know from the news, the State of California has suffered severe rains and flooding conditions, and our county, Shasta County, is no exception. The attached article appeared in the *Record Searchlight* today confirming the position of the NEXRAD Task Force. The coverage given from Sacramento simply does not give adequate coverage to the northern part of the state due to the mountainous topography, among other things.

Please give consideration to this information in your evaluation of our need for a NEXRAD unit in this region.

Very truly yours,

Robert C. Anderson
Mayor

mayr452.rca/ga
Enclosure

JAN 24 1995

760 PARKVIEW AVENUE, REDDING, CA 96001-3396 • P.O. BOX 496071, 96049-6071 • (916) 225-4000

RECORD SEARCHLIGHT
WEDNESDAY, JANUARY 18, 1995

Radar underestimated amount of precipitation

Clouds and distance affect estimate

■ North state officials say having a NEXRAD in the northern Sacramento Valley would help during big storms like the ones that recently flooded the region.

By Robert C. Holquist
R-S health & environment reporter

The National Weather Service is learning that its next generation of weather radars may not determine how much rain is falling over California as well as hoped.

The revelation has renewed the call for the weather service to keep its Redding office open and to place a next generation radar (NEXRAD) somewhere closer to the north state than current plans call for.

Norm Hoffmann, area manager for the National Weather Service in Monterey, said any radar, either a NEXRAD Doppler radar or an older model, has difficulty measuring rainfall from low, warm, layered clouds.

The radars do a much better job of predicting rainfall amounts from tall, convective clouds like those found in summer thunderstorms over the Midwest.

But the clouds that brought flooding to California came in low layers that squeezed rain out as they flowed up and over mountains.

Hoffmann said NEXRAD radars in Monterey "underobserved" rainfall amounts in the San Francisco Bay area during the recent storms.

"Therefore, our spotters, gauges and county offices of emergency services remain important" to accurately predict rainfall amounts, Hoffmann said Tuesday.

A weather service report on the performance of the NEXRAD ra-

See RADAR, A-8

eted by their mother, who en killed herself, police id

The children were discoved after a co-worker lookg for their mother called lice when no one anered the door at her me. Officers who broke e door open found the inred children and their other's body Tuesday, said lice Lt. Tom Langford.

Jessica Fowler, 13, was on e living room floor with a nshot wound to the back. r 10-year-old brother, lam, shot through the ck, was lying in a bedroom xt to the body of his moth- Karrie Lee Rhodes.

The children were without d or water since being ot about four or five days rlier.

arrakhan says : is innocent

CHICAGO — In a speech rflowing with emotion, uis Farrakhan declared innocence Tuesday ht in the assassination Malcolm X and accused government of trying to stroy black unity with its lictment of Malcolm's ighter.

'arrakhan said Malm's daughter Qubilah ibazz, who is accused of tting Farrakhan's assasation, was manipulated l he hoped she would be convicted.

le said the indictment urned last week in Minipolis could be a first) toward prosecuting i as well as Ms. Shaba-

e called on the governat to open all files conning not only the Mali X case but also the issination of President inedy.

pe embarks hectic day

)RT MORESBY, Papua Guinea — Pope John l II, on an ambitious n tour, faces his most ling day today as he d a whirlwind stop at Moresby and headed Australia.

ie pope's departure for ney was delayed by 25 ites by a mechanical [illegible] that forced his

---

Meanwhile, the city and county have argued over various schemes to distribute sales tax and property tax revenue from the truck stop and surrounding properties.

gest priority.

"In my opinion if the county supervisors and the council can't resolve this thing in favor of jobs, then shame on us all," he said.

Radar

Continued from A-1

dars during Bay area storms in November 1994 states the radars failed to properly estimate rainfall amounts. The computer software that helps meteorologists analyze signals gathered by the radars has a problem that resulted in underestimating the amount of rainfall that actually hit the ground, in one case by a factor of 100.

Hoffmann said the weather service is working on the software problems and may get permission to rewrite the programs. The radars do a better job of seeing winds and rain at closer ranges, he said.

A task force, established by the city of Redding because of a proposal to close the weather service office at the Redding Municipal Airport and not to place a NEXRAD in the northern Sacramento Valley, has argued that a radar placed near Red Bluff would be better able to serve the north state.

Task force members have repeatedly raised the issue of whether a NEXRAD outside the north state would spot heavy rains over the mountains near Redding.

"This confirms those things the task force has been trying to tell the weather service for several years," Redding Assistant City Manager Sam McMurry said of the report that the NEXRADs did a poor job estimating rainfall.

"The greater Redding area and Shasta County needs to have a NEXRAD located as close to the center of activity as possible," McMurry said.

Present plans call for closing the Redding weather office and transferring forecasting duties to Sacramento.

Elizabeth Morris, meteorologist in charge of the weather service office in Sacramento, said her new NEXRAD performed wonderfully during the recent big storms. The Sacramento radar provided good coverage to "just short" of Redding, but could not see over the city or north of it, Morris said.

Although the software problems may have limited the rainfall amount estimates, Morris said, the Sacramento radar did a good job.

"It gave us information on things we've never seen before," Morris said.

For example, the Sacramento office received reports of a tornado in the Yuba City area last week, but the NEXRAD was able to show the phenomenon was not a tornado, but a "gustnado," Morris said.

A "gustnado" forms closer to the ground than a classical tornado and has no rotation. Although they can cause damage, the strong winds are not as damaging as tornadoes, she said

The NEXRAD also allowed the Sacramento office to put out more precise flash flood warnings, Morris said.

Hoffmann said the weather service will be able to provide adequate coverage for the north state when the Sacramento office takes over forecasting responsibilities and more people are added to the staff there.

Keswick releases kicked upward

KESWICK DAM — Water releases from Keswick Dam into the Sacramento River were increased to 20,000 cubic feet per second (cfs) Tuesday afternoon.

The U.S. Bureau of Reclamation increased flows from 15,000 cfs to 17,500 cfs at 2 p.m. Tuesday, then cranked the release up to 20,000 cfs at 4 p.m., spokesman Bill Mauck said.

The water will help dilute acid mine drainage flowing from the Spring Creek Debris Dam below Iron Mountain Mine and also allow more storage space for a flood-control cushion in Lake Shasta, which was holding 3.3 million acre-feet of water Tuesday.

The giant reservoir was 73 percent full Tuesday.

Storms' damage tally is put at $4 million

Last week's storms in Shasta Lake

A tractor-trailer rig lies wrec where the death toll was at

Quake

Continued from A-1

We reached the outskirts Kobe just past midnight, after t hours of walking, and saw seve damage to new buildings as w as old. A bank building of sev or eight stories leaned over t sidewalk. A five-story buildi that appeared fairly new had to pled onto its side.

The shaking Tuesday last about 20 seconds, and when was over, 8,380 buildings were c stroyed. Many people slept o side for fear aftershocks wou cause further damage to buildin left standing.

Only a few fires still burn today. One building near the ra road station was burning vi lently, but few firefighters were sight. The surrounding area w nearly destroyed, and there w no place for the fire to spread.

In many places, there was strong smell of leaking gas.

Osaka, Japan's second-large city and across the bay fro Kobe, was also heavily damage The wreckage extended 50 mil northwest of Kobe to the ancie capital, Kyoto, where treasure Buddha statues and a five-sto pagoda built in 951 suffere minor damage.

More than 600 aftershocks h the area through this morning, i cluding 60 that could be felt.

National police said 2,014 pe ple were known dead by midd today, 1,058 were missing ar 11,977 injured. One American wa among those killed, the U.S. Er bassy said. Details were withhe pending notification of next kin.

People stood around wit stunned, blank faces, wrapped i blankets against the biting col which dropped below freezir overnight. If they spoke at all, was in soft, subdued murmurs.

In one rare show of emotion, girl drove a car up to som friends she recognized, openc the door and fell out onto th ground, sobbing.

Settlement

Continued from A-1

main secret, but Deputy Attorne General Alberto Gonzalez, wh defended the state, released th information following a Californ

HO 40100 435

Board of Supervisors

COUNTY OF TEHAMA

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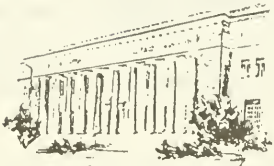

Tehama County Courthouse

Richard Robinson
Administrative Assistant
to the Board of Supervisors

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JAN 18 1995
CITY CLERK'S OFFICE

January 10, 1995

Ms. Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, MD 20910

RE: NATIONAL WEATHER SERVICE PUBLIC COMMENT

Dear Ms. Scanlon:

The Tehama County Board of Supervisors opposes the National Weather Service restructuring plan in that the current proposal under review would result in a downgrading and possible deterioration of services to the citizens of Tehama County.

Tehama County also opposes the compromise proposal of May, 1994 which would allow limited services to be performed and delivered from the Redding Weather Station. This compromise would not serve the residents of the Northern Sacramento Valley in their needs for full service operations.

The Tehama County Board of Supervisors joins Congressman Vic Fazio, the Shasta County Board of Supervisors, and the City Councils of Redding and Red Bluff in support of a fully operational weather station in Redding and the location of a NEXRAD radar station on government property in the Red Bluff area. This proposal presents maximum benefit to the citizens of northern California.

We appreciate the opportunity to comment on this matter.

Sincerely,

Shirley M. Marelli

Shirley Marelli,
Chairperson

SM/bgm

cc: Redding and Red Bluff City Councils
Shasta County Board of Supervisors
Hon. Vic Fazio

Meetings 10:00 A.M. Tuesday of Each Week
P.O. Box 250 • 633 Washington St., Red Bluff, CA 96080 • (916) 527-4655 • FAX (916) 529-0980

United States
Department of
Agriculture

Forest
Service

Shasta-Trinity
National Forests

Redding, CA. 96001
(916) 246-5222
TDD (916) 246-5313

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JAN 5 1995
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Reply To: 5120-2/5100/1300/1500

Date: January 3, 1995

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms Scanlon:

This is to express our concern over the displacement of the National Weather Service facility in Redding by the current NEXQAD proposal.

The Shasta-Trinity National Forests is one of seven National Forests located in Northern California that relies heavily on the dedicated fire weather staff to provide local and spot forecasts in support of our yearly fire season and prescribed burning programs.

The proposed elimination of the National Weather Service office located here in Redding, California, will have a significant impact to our fire protection and forest health programs.

Just the Shasta-Trinity National Forests experience between 250-350 wildland fires each year. Our past five-year average is 266 fires per year. The fire weather forecasts are a vital part of our suppression/pre-suppression planning operation. It is easy to see that if the other Forests, parks, and private land fires were factored in, there would be well over a thousand fires where we and partner agencies require information critical to successful suppression efforts as well as to safety of firefighters and surrounding communities.

Prescribed fires are a key tool for reducing hazardous fuels and forest health burning. We accomplished approximately 3,400 acres for our Fiscal Year (FY) 1994 prescribed burning program. In FY 1995, we expect to increase those acres to 4,000, and by FY 1997, increase to about 30,000 acres per year. Here again, many other agencies do this same work in this part of California. Local fire weather forecasts are critical in helping us find the right weather conditions to accomplish the burn projects and meet air quality/smoke management guidelines.

The workload is increasing as we move toward an ecosystem management/forest health approach.

I hope this information will be useful to you.

Sincerely,

STEVE FITCH
Forest Supervisor

cc: R.C. Anderson, Mayor, Redding, CA
W. Herger, U.S. Congress
G. Lynn Sprague, Regional Forester

10/9/95 Copy to Julie Scanlon
Mayor Anderson

Superior California Economic Development District
Modoc • Shasta • Siskiyou • Trinity
4352-A Caterpillar Road • Redding, CA 96003 • (916)241-8720 • FAX:(916)241-1712

January 4, 1995

Honorable Roy Brown
Secretary of Commerce
c/o Redding City Manager
760 Parkview Avenue
Redding, CA 96001

Re: Retention of U.S. Weather Bureau Office and Installation of NEXRAD

Dear Mr. Secretary:

Please accept this letter as our notice of strong support in favor of retention of the Weather Bureau Office in Redding and installation of a Next Generation Radar (NEXRAD).

The Redding area is the primary commercial center for all of Northern California and it only makes sense to retain the existing weather station at the present location. Accurate and timely weather reporting in the local area is crucial for this major transportation center, especially for highway freight travelling on northern routes from Redding. Interstate 5 through Redding is the primary transportation route north out of California. With Redding being the major medical center for all of Northern California and parts of Southern Oregon and relying very heavily on air transportation, a local, accurate and timely weather report and forecast is crucial as well. Northern California agricultural and timber industries rely on accurate weather reporting for cultural and harvesting operations. This is especially crucial for planning timber harvesting operations in which soil compaction and erosion in inclement weather conditions can be extremely detrimental. Also in nursery strawberry plant harvesting, the ability to obtain current and timely weather forecast information is extremely important for planning harvesting operations of this multi-million dollar industry in Northern California.

This is not to trivialize the importance to other local communities that may be considered as alternate locations for the Weather Bureau Office and NEXRAD, however, from an economic consideration, the most benefit from local industry can be obtained from the present central location in the Redding area. Further, it makes no sense to set-up a new office when the Bureau has an existing office already located in Redding.

Again, as an economic and business development organization in Northern California, we strongly support retention of the existing Weather Bureau Office and installation of NEXRAD at the present existing location.

Sincerely,

Robert Nash

Robert Nash
Executive Officer

RN/bl
C:NEXRAD

December 31, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon: Re: NEXRAD

We know you may not be as familiar with California as with the beltway areas but we want to reiterate the importance of the Weather Station in Redding.

Not only does this pose a threat to air travel safety but also to agricultural weather forecasts and fire-fighting capabilities should a decision to close this Weather Station be made. It is important that we retain this facility.

Recent tragic airplane crashes serve to point out the importance of a thorough knowledge of existing weather since our area is serviced by smaller planes.

Climatic conditions can vary greatly within a relatively few miles. There are vast differences in weather data between Sacramento, Medford, Reno, Eureka and Redding. Readings on I-5 North of Redding differ greatly from those in the aforementioned localities where mileage might indicate many similarities.

Redding loses businesses such as the recent departure of Citizens Utilities who among other reasons for leaving decry the limited airline service. Losing the Weather Station complicates and downgrades what Redding can offer to businesses and to travelers. It is of the utmost importance that Redding KEEP JOBS and PROVIDE INCENTIVES to keep businesses here and in the State of California.

On a more personal note our granddaughter uses the airport several times a year enroute to Washington State to attend college. Our son flies from the east coast several times a year.

Please give this appeal your most serious consideration. We await your response with interest and hope that you will look with favor on this urgent concern.

Respectfully yours,

Treva S. Rice

Robert E. Rice

STATE OF CALIFORNIA-THE RESOURCES AGENCY
PETE WILSON, Governor

DEPARTMENT OF FORESTRY AND FIRE PROTECTION
6105 Airport Road
Redding, California 96002
(916) 224-2445

NEXRAD file

S

RECEIVED
DEC 22 1994
CITY CLERK'S OFFICE

December 20, 1994

Ms. Julie Scanlon
National Weather Service
East - West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

This letter is to express concerns of the California Department of Forestry and Fire Protection (CDF) of the National Weather Service decision to close the Redding Weather Service office (RWS/NWS) and not to install the NEXRAD radar system in the greater Redding area. The proposed closure would greatly affect our ability to provide accurate forecasts throughout the Region and contribute to the degradation of service that is provided.

CDF provides fire protection to a vast majority of lands in the State of California. The northern part of the state relies heavily on the dedicated staff at the Redding Weather Service Office for general forecasts and daily briefings of predicted fire weather for both local and statewide resource movement planning. They played a vital role during major "siege" conditions experienced during 1987, 1990, 1992 and 1994 for resource allocations in California and on a national level. The office provides spot forecasts in support of wildland fires, vegetation management burns (control burns), hazardous materials spills and natural or human-caused disasters and provides the mobile fire unit (ATMU) at scene for micro weather forecasts. They also provide current informed weather conditions for our ground resource movement and aircraft, both fixed and rotary wing, that are assigned to incidents and administrative flights. Weather prediction plays a critical role in fire control methods and the safety of personnel assigned to incidents.

In conclusion, the RWS/NWS office forecasts are crucial and have played a significant role in the cooperative efforts of CDF and other agencies committed to the high level of professionalism toward preserving the safety of life, property and our natural resources in the State of California.

Sincerely,

Lloyd I. Keefer, Region Chief
Coast-Cascade Region

By Manny Limon
Manny Limon
Deputy Chief, Operations

mab
cc: Robert C. Anderson

WORLD WIDE TRAVEL

ASTA

2986-A BECHELLI LANE • REDDING, CA 96002 • (916) 221-0271

28 December 1994

Roy Brown, Commerce Secretary
c/o Redding City Manager
760 Parkview Ave.
Redding, Calif. 96001

Dear Mr. Brown:

Please pay attention to the wants and needs of Redding and Shasta County. We are a growing community and need your support.

Nexrad will provide us with low-altitude forecasts, which are essential because of our area's topography.

Economically, the closure would be detrimental to the growth of Redding and surrounding areas. I believe that this closure will make it more difficult to predict weather locally and this decision constitutes a safety hazard to our community. This closure would sincerely hurt our efforts and effect many local businesses both directly and indirectly. Having been in the travel industry for over 40 years, I feel that my experience should encourage you to help support keeping the National Weather Service Station in Redding open..

Sincerely,

Lucille Tyner, Owner

cc: Julie Scanlon
National Weather Service
East West Highway 1325
Silver Springs, Maryland 20910

St. Elizabeth Community Hospital

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12-28-94

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

I am writing on behalf of St. Elizabeth Community Hospital in Red Bluff, California. We are a small rural facility that depends on air support to transfer patients for Trauma/Cardiac/Obstetrical support through out the year.

The National Weather Service has begun a modernization program which will greatly affect the patients in Tehama County. The proposed plan calls for all "forecast" weather to be gathered and relayed to the Redding area where our air support transport teams are based. This "forecast" will come from the Sacramento area, and will not be accurate for the type of reports needed to transfer patients in a safe, effective manner.

Legislation has been passed which will close the Flight Service Station here in the Red Bluff by early 1995, and the National Weather Service Station located in Redding, California in two years. The National Weather Service has elected not to install an NEXRAD radar system in the greater Redding area, and this will in turn, not provide proper care for our patients in Tehama County.

With bad weather, the medical pilots must depend on an accurate weather report, and with current planned changes, our pilots will not have the necessary information needed to decide if a safe flight can occur.

We are asking for your help for the benefit of our patients. They deserve the same care as a patient in an urban area. It is our responsibility to provide that care, and we are asking you to help the National Weather Service to locate NEXRAD services in Redding, California which will maximize the safety of our patients and staff.

Sincerely,

Penny Costa

Penny Costa RN, MHL
Director of Emergency/Critical Care Services

Sisters of Mercy Serving Our Area Since 1881
[illegible] Sister Mary Columba Drive • Red Bluff, CA 96080-[illegible] • (916) [illegible] 8000

December 31, 1994

Honorable Wally Herger
2433 Rayburn
House Office Building
Washington, D. C. 20515

Dear Congressman Herger: Re: NEXRAD

We know you are familiar with the NEXRAD issue. Our own Mayor Robert C. Anderson is, as you may know, Chairman of the Nexrad Task Force. We believe it is vital to keep the Weather station capability in the Redding area.

Recent tragic airplane crashes serve to point out the importance of a thorough knowledge of weather since our area is serviced by small planes.

Given these occurrences only serves to underscore the threat to air travel safety but also to agricultural weather forecasts and fire-fighting capabilities should a decision to close this weather Station be made. It is important that we retain this facility.

Climatic conditions can vary greatly within a relatively few miles. There are vast differences in weather data between Sacramento, Medford, Reno, Eureka and Redding. Readings on I-5 North of Redding differ greatly from those in the aforementioned localities where mileage might indicate many similarities.

Redding loses businesses such as the recent departure of Citizens Utilities who among other reasons for leaving decry the limited airline service. Losing the Weather Station complicates and downgrades what Redding can offer to businesses and to travelers. It is of the utmost importance that Redding KEEP JOBS and PROVIDE INCENTIVES to keep businesses here and in the State of California.

On a more personal note our granddaughter uses the airport several times a year enroute to Washington State to attend college. Our son flies from the east coast several times a year.

Please give this appeal your most serious consideration. We await your response with interest and hope that you will look with favor on this urgent concern.

Respectfully yours,

Treva S. Rice

Robert E. Rice

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December 20, 1994

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CITY CLERK'S OFFICE

Ms. Julie Scanlon
National Weather Service
East-West Highway # 9372
Silver Spring, MD 20910

Dear Ms. Scanlon:

The California Society of Professional Engineers has been following the scheduled closure of the Redding Forecasting Center, and the possibility of establishing a NEXRAD facility in the area. The latest news report we saw has the proposed NEXRAD site in Oroville.

A real-time, short distance weather forecasting center in the northern Sacramento Valley area is vital to resource management, commerce, and public safety. NOAA must be able to observe weather inland from the coast for the northern Valley, and for the Coast, Siskiyou and Cascade Mountains. A NEXRAD facility is essential in this area. A site at Oroville would not complement coverage from other stations as well as a Site farther north, such as near Redding.

CSPE strongly recommends installation of NEXRAD at Redding.

Resource management items to be considered are forest harvest, fire prevention and recreation; public and private water system operation for both supply and flood control (the largest combined water system for agriculture, industrial and municipal use in the world), including endangered salmon and the Federal Central Valley Project; and mining in streams and flood plains. Commerce includes the extremely heavily used I-5 corridor; agriculture (valley cultivation and mountain grazing); commercial airlines (low and high altitude); tourism; three high voltage power lines that connect the Columbia River system with California (in total the largest power load system in the nation); and construction to accommodate population growth.

Continued. . .

Ms. Julie Scanlon

Public safety include activities and travel associated with the foregoing; in particular public officials must be able to manage traffic and aircraft between Redding and Medford during winter storms to reduce the number of fatalities that occur every year, and reduce the loss of perishable commodities and other loads.

Sincerely,

John J. Troy /DA
John. J. Troy, PE
President

cc: ✓Mr. Robert C Anderson, Mayor
City of Redding

Mr. Francie Sullivan, Chair
Shasta Co. Board of Supervisors

Congressman Vic Fazio

Congressman Wally Herger
Chico

Ms. Shawne Mohoric, District Ranger
U.S. Forest Service
Shasta-Trinity National Forests
Shasta Lake Ranger District

DEC 19 1994

NC-105
RES-7.00

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DEC 20 1994
CITY CLERK'S OFFICE

Ms. Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Subject: Redding Area NEXRAD

Dear Ms. Scanlon:

Maintenance of the highest level of meteorological support is critical to our long-term ability to provide water and power for the California economy while maintaining mandatory levels of flood protection. We therefore support the City of Redding's request for a NEXRAD site within the Upper Sacramento River Valley.

State-of-the-art meteorological support for this area is critical because the streams of Northern California, from the American River northward, are the ultimate source of the firm yields of the Central Valley Project (CVP) and the State Water Project (SWP). These streams supply the reservoirs and stream diversions, which in turn provide the dependable water supplies for much of California, an arid state, that lacks rain six months of each year. The CVP alone supports a three billion dollar agricultural sector in the Central Valley, and also supplies a significant component of the municipal and industrial water supply for the Los Angeles and San Joaquin Basins, either by direct sales or sales to the SWP.

Continued maximization of water storage, and hence, water supply is jeopardized over the long term by the continuing urbanization of the flood plains of the Sacramento River and its tributaries. The attendant increased risk of flood damage, if not controlled, will lead to political pressure for larger reservations of storage space behind Shasta Dam, at the expense of water storage, as has happened at Folsom Dam, upstream of Sacramento, California.

Because we lack control over residential and commercial development in flood plains, Reclamation must rely on improvements in the state-of-the-art of precipitation measurement and forecasting, such as NEXRAD, to assure maintenance of both present levels of flood protection and current levels of water and power supply. Thus, we are concerned that the Upper Sacramento River Valley and adjacent watersheds be adequately covered by NEXRAD. We understand the geometry of the proposed NEXRAD net does not provide coverage for the types of storms that generate the major floods on the Sacramento and its uncontrolled tributaries. Therefore, we support installation of a NEXRAD in the Upper Sacramento River Valley to provide low-altitude coverage of the Sacramento and Pit River Basins and the drainages of the major uncontrolled tributaries such as Clear, Cottonwood, Cow, Battle, Deer, and Mill Creeks. In addition, this installation would also give us better information for flood control and operation of the Trinity River reservoir system. This system, by enhancing managerial flexibility of the other reservoirs in the CVP, functions as an integral part of the flood control/water supply system of the Sacramento River Valley.

Availability of high-quality precipitation data also remains a concern with respect to both fisheries issues, discussed in our June 29, 1994, letter, and the management of the highly-acidic, heavy-metals laden runoff from the Iron Mountain Superfund Site. This latter concern involves toxic drainage into the Sacramento River immediately upstream of both the prime spawning grounds for the endangered winter-run Chinook salmon and the water intakes for the public water supplies for the City of Redding. While the risk of a catastrophic spill appears to be low, runoff from this site poses a threat to both public health and this federally-listed species. These threats are partially mitigated by the control of releases from the Spring Creek Debris Dam, a structure that impounds up to 20,000 plus acre-feet of extremely acidic (pH 1) water at any one time, but the possibility of uncontrolled spills during high flows is a continuing concern.

In summary, low-altitude NEXRAD coverage of the watersheds of Northern California is critical to our long-term ability to provide adequate flood control, protect public water supplies, supply water to multi-billion dollar sectors of the California economy, and comply with the directives of the Department of Commerce under the Endangered Species Act.

Sincerely,

J Paul Capener

J. Paul Capener
Area Manager

Enclosure
June 29, 1994, letter to Francie Sullivan

cc: Mr. Robert C. Anderson, Mayor
City of Redding
760 Parkview Avenue
Redding, California 96001-3396

United States Department of the Interior

BUREAU OF RECLAMATION
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, California 96019-8400

IN REPLY REFER TO:
NC-100
RES-7.00

JUN 29 1994

Ms. Francie Sullivan
Board of Supervisors
1815 Yuba, Suite 1
Redding, California 96001

Subject: Redding Area Weather Forecasting Services

Dear Ms. Sullivan:

The possibility of reducing weather forecasting services within the Redding-Shasta County area by closure of the Redding forecasting center has been of concern to both the City of Redding and Shasta County. Reclamation's Northern California Area Office supports you in your efforts to retain local forecasting abilities.

As you are aware, many Federal and State agencies are involved in a very intensive long-term program to restore salmon population in the Sacramento River, including the endangered winter-run salmon. Our efforts in this federally-mandated program have involved development of some very sophisticated, computerized river temperature models.

A critical element to the success of these models is accurate and timely air temperatures and storm forecasts. This data is being provided by the local Redding forecast center. If this service were to be discontinued, it would reduce the accuracy and calibration of our computer models. We use information provided by the forecast center on a daily basis in conjunction with other information which, in turn, is used to determine river flow releases and hydroelectric power generation.

We support you in your efforts to maintain this service, as it provides a very valuable service for our operations.

Sincerely,

B. Gibbons

FOR J. Paul Capener
Area Manager

cc: Mr. Bob Christofferson, City Manager
City of Redding
760 Parkview Avenue
Redding, California 96001

c: City Manage

Trinity
Hospital

P.O. Box 1229
Weaverville, California 96093
(916) 623-5541

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DEC 21 1994
CITY CLERK'S OFFICE

December 19, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

This letter is to express the concerns of Trinity Hospital regarding the national Weather Service decision not to install a NEXRAD radar system in the greater Redding area. Redding Medical Center and Mercy Medical Center operate air ambulances serving areas throughout northern California. As a rural facility in this service area we rely on these air services to transport critically ill or injured patients to the appropriate medical facility in a very short period of time. Their ability to provide a safe service has been greatly assisted by the location of the National Weather Service facilities in the Redding area. The decision of the National Weather Service to install NEXRAD capability in Sacramento rather than Redding will reduce the quality of the weather information so vital for the operation of an air ambulance service.

The terrain between Shasta County and the Trinity County area west of Redding provides for challenging flying conditions. Some of the most severe flying weather in the country occurs each winter in the mountains surrounding Redding and Shasta County. In addition, the weather conditions change dramatically. As we understand the system, these changing events cannot be easily identified through NEXRAD services provided out of Sacramento. Our concern is that we will not have the same level of service that we would have if NEXRAD were located in the Redding vicinity.

We understand that the mission of the National Weather Service is to save lives and property by watching for adverse weather systems and warning people of the approach of those systems. In order for Redding Medical Center and Mercy Medical Center to respond promptly and safely to the needs of the injured victims in our area, they need to know what is happening with the weather and the impact it will have on aircraft and patients. The system we will have once the National Weather Service installs services in Sacramento will not be as good as it should be for our area. We are concerned that this compromised weather warning system will have an adverse effect on the effectiveness of our air ambulance service.

We strongly advise that the National Weather Service reconsider its decision and install a modern system located in the North Valley region that will be better able to predict weather systems that will affect all of us. Failure to do so will risk compromising our ability to respond to patients who need and depend on air ambulance capabilities.

We urge the National Weather Service to locate NEXRAD services in our immediate area to maximize the safety of the patients we serve.

Sincerely,

Patricia Menning
Administrator

sw
cc: Robert C. Anderson

CALIFORNIA
SOCIETY OF
PROFESSIONAL
ENGINEERS

910 FLORIN ROAD, SUITE 112 • SACRAMENTO, CA 95831-3569 • TEL: 916/422-7788 • FAX. 916/422-77
Sacramento Valley Chapter

December 16, 1994

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DEC 22 1994
CITY CLERK S OFFIC

Ms. Julie Scanlon
National Weather Service
East-West Highway # 9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

The California Society of Professional Engineers has been following the scheduled closure of the Redding Forecasting Center, and the possibility of establishing a NEXRAD facility in the area. The latest news report we saw has the proposed NEXRAD site in Oroville.

A real-time, short distance weather forecasting center in the northern Sacramento Valley area is vital to resource management, commerce, and public safety. NOAA must be able to observe weather inland from the coast for the northern Valley, and for the Coast, Siskiyou and Cascade Mountains. A NEXRAD facility is essential in this area. A site at Oroville would not complement coverage from other stations as well as a Site farther north, such as near Redding.

The Sacramento Valley Chapter of CSPE strongly recommends installation of NEXRAD at Redding.

Resource management items to be considered are forest harvest, fire prevention and recreation; public and private water system operation for both supply and flood control (the largest combined water system for agriculture, industrial and municipal use in the world), including endangered salmon and the Federal Central Valley Project; and mining in streams and flood plains. Commerce includes the extremely heavily used I-5 corridor and the Southern Pacific Railroad; agriculture (valley cultivation and mountain grazing); commercial airlines (low and high altitude); tourism; three high voltage power lines that connect the Columbia River system with California (in total the largest power load system in the nation); and construction to accommodate population growth. Public safety

Continued . . .

Helen Couser
P. O. Box 22
Whitmore, CA 96096-0022

Dec. 15, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Springs, Maryland 20910

Dear Ms. Scanlon:

The decision to remove the National Weather Service (NWS) from Redding, California is an unwise decision for many reasons:

1. This leaves a very large area of northern California, 17,400 square miles, without the advisory services not covered by NEXRAD.

2. A potential life-threatening situation that will affect the general economy of the northwest region, already reeling from disastrous cutbacks in the lumber industry, including other economic downturns to much smaller businesses and hospitals.

3. Federal and state air attack units, so essential to fighting wildland fires, fly out of Redding, Municipal Airport, the present location of NWS.

4. Agriculture interests have a high degree of concern over the loss of the local weather station.

5. Shasta Dam was built by contract under the U. S. Bureau of Reclamation and NWS to provide flood control, water supplies, and power for much of California.

6. We must preserve the location of a NEXRAD unit to serve this region where it can "see" into the Sacramento River canyon area.

7. A location on the coast or in Nevada will not suffice, for radar does not go through mountains.

8. Interstate Commerce, a concern of your office, will also be adversely affected by the loss of NWS at Redding Municipal Airport.

9. Both Interstate 5 and the railroad serving all of the coast from Seattle to San Diego pass through a "choke point" in northern Sacramento valley at altitudes that produce snow and adverse weather.

10. Forthe California Department of Transportation, California Highway Patrol, Mercy Medical Center, Redding Medical Center without

weather information is the difference between life and death. The two combined hospitals fly 1500 plus air ambulance missions a year.

We respectfully ask your office to look into this situation:

Are the objectives of the Clinton Administration being served by the National Weather Service? A. Is it wise to alienate the whole of northern California? B. Northern California needs and must have local NWS. C. Northern California and surrounding mountainous states need the President's leadership in this matter.

Very truly yours,

CC Robert C. Anderson, Chairman NEXRAD task force
Congressman Wally Herger
Congressman Vic Fazio

VIC FAZIO
3RD DISTRICT, CALIFORNIA
VICE CHAIR-DEMOCRATIC CAUCUS

COMMITTEES
APPROPRIATIONS
SELECT COMMITTEE ON HUNGER
DEMOCRATIC STEERING AND POLICY

c: City Mgr.

PLEASE RESPOND TO:

☐ 2112 RAYBURN HOUSE
OFFICE BUILDING
WASHINGTON, DC 20515-0503
(202) 225-5716

☐ 7226 MAIN STREET
WOODLAND, CA 95695
(916) 666-5521

Congreſs of the United States
House of Representatives
Washington, DC 20515-0503

December 14, 1994

RECEIVED
DEC 14 1994
CITY CLERK'S OFFICE
By ______________

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

Thank you for the opportunity to again express my opposition to the National Weather Service (NWS) modernization and restructuring plan. This correspondence is for your 60-day public comment period.

After a thorough examination, I have concluded that closure of the Redding Weather Station is not in the best interest of residents in the 17,400-square mile area of the northern Sacramento Valley. It would result in a degradation of service.

Also, I oppose the NWS compromise proposed last May to keep the Redding Weather Station open for fire, weather and agricultural purposes. Again, it would lead to a deterioration of service.

I support the proposal of Red Bluff Mayor Ryan Sale to locate a NEXRAD radar in the Red Bluff area on government property. This proposal has been embraced by the Redding City Council.

A NEXRAD in the Red Bluff area would be in a much better position to cover the upper reaches of the Sacramento Valley, including the Sacramento River Canyon where adverse weather originates most of the time. A fully operational Weather Station could then remain in Redding.

Finally, it should be noted that the uncertain future of Beale Air Force Base makes radar service from that facility unreliable.

Again, thank you for the opportunity to have further input.

Sincerely,

Vic

VIC FAZIO
Member of Congress

CC: Red Bluff and Redding city councils

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

c. city manage

INTERMOUNTAIN DEVELOPMENT CORPORATION
BOX 450, BURNEY, CA 96013

December 13, 1994

RECEIVED
DEC 14 1994
CITY CLERK'S OFFICE

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland

Dear Ms. Scanlon:

The Intermountain Development Corporation wishes to express it's concern over the possible loss of a weather station located in the Redding area. People in the Intermountain area are dependent upon knowing forecasted weather conditions for their livelihoods.

Foresters, Loggers, Timberland Owners, Ranchers, Rice Growers, Farmers, Recreationists and Citizens all have an urgent need to know the latest forecast to conduct their activities in the most efficient manner. Highway road conditons affect all who live, work and play in the Intermountain Area. A reliable and dependable weather station located in Shasta County can provide the services required.

It is also important that available weather information be disseminated as quickly and widely as possible to enable people to act upon the knowledge abtained.

Sincerely

Ellen Songer

Ellen Songer
Secretary

CC: Robert C. Anderson, Mayor

c: City Manager

JON H. BAYERS, M.D.
A Professional Corporation
EYE PHYSICIAN AND SURGEON

MAIN OFFICE
1441 Liberty Street, Suite 205
Redding, California 96001
(916) 241-6550

ASSOCIATE OFFICES
110 Chestnut Street
Mt. Shasta, California 96067
(916) 926-5159

1727 Main Street
Burney, California 96013
(916) 335-2233

RECEIVED
DEC 15 1994
CITY CLERK'S OFFICE
By

December 13, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Julie Scanlon:

I am concerned by a proposed legislation to remove the National Weather Service from Redding, California.

I think this is an unwise decision for many reasons. It leaves a very large area in Northern California without the advisory of the weather service which is a detriment to civilian navigation as well as the local economic interest and the flight services of local healthcare providers. I think this would be a serious misgiving and leaves a large gap in the service areas provided by NEXRAD. The area is remote and lightly populated and a lot depends upon air service for many functions. The agriculture community will also be ill-served by its leaving.

I would strongly hope that you will reconsider any decisions to close this facility.

Sincerely,

Jon H Bayers

Jon H. Bayers, M.D.
JHB:djf

cc: Mayor Robert C. Anderson
City of Redding
P.O. Box 496071
Redding, CA 96049-6071

c: City Manager

ROSEBURG
RESOURCES CO.

ANDERSON DIVISION

RECEIVED
DEC 15 1994
CITY CLERK'S OFFICE
By

December 15, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Springs, Maryland 20910

Re: NEXRAD

Dear Ms. Scanlon:

Roseburg Resources Co owns and manages approximately 320,000 acres of commercial timberland in northern California, and many of the activities we undertake in the management of this timberland require timely and accurate weather forecasts. It is imperative we obtain both short and long term weather predictions for scheduling slash burning, tree planting, and herbicide applications. During harvest operations we are required by California Forest Practice regulations to coordinate erosion control activities with predicated weather events.

The proximity of the NEXRAD office to our timberland has been invaluable to the accomplishment our forestry objectives. Our foresters monitor the weather broadcast and have come to depend on the detailed discussions available by telephone. The coordination and scheduling required in our operations, spread over northeastern California, and complex and in many cases, weather dependent. We believe this type of localized weather service is beneficial to our operations.

In this era of the government hemorrhaging red ink, Roseburg feels each and every federal program must be evaluated for cost and benefit, and those programs not providing a net public benefit should be stopped If a localized, relatively accurate short and long term weather prediction is available and guaranteed from another source at significantly reduced federal expenditures it may be prudent to close the NEXRAD Office. However, we would oppose the abandonment of NEXRAD without a suitable replacement service.

Sincerely,

Bruce Olsen

Bruce Olsen
Forester

c Robert Anderson, Redding

C \ \ \nexrad01

P O BOX 697 ANDERSON CALIFORNIA 96007 PHONE (916) 365 7661

c: City Manager

CH2M HILL
Engineers
Planners
Economists
Scientists

RECEIVED
DEC 13 1994
CITY CLERK'S OFFICE

December 12, 1994

SWA210.99.AD

Ms. Julie Scanlon
National Weather Service
East-West Highway No. 9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

Subject: Possible Closure of the Redding, California, Weather Station

CH2M HILL is a consulting engineering firm that provides engineering services to clients throughout the world. With a staff of 155, we are Shasta County's sixth largest employer. We have recently been informed that the National Weather Service will likely close its office in Redding when the NEXRAD radar system is fully implemented. This has serious implications for both public safety and the economy of Northern California.

The National Weather Service apparently proposes that the Northern Sacramento Valley be served by NEXRAD stations located at Sacramento and the Beale Air Force unit at Oroville (other nearby stations at Medford, Reno, and Eureka are unusable because of intervening mountains). However, the distance to Sacramento is greater than the nominal 125-mile range of the NEXRAD unit, and we have been unable to receive any assurance that the Air Force will make data available for civilian use. Therefore, adequate weather forecasting data will be unavailable. This seems to be a clear degradation of weather services, which is prohibited by Public Law 102-567.

The ramifications of degraded service are serious. Redding is the U.S. Forest Service firefighting headquarters for all of Northern California. If weather forecasting information is incomplete or inaccurate, both our timber resources and the lives of our firefighters will be in jeopardy. Agricultural management will also be hindered. As an air ambulance center for two major hospitals and a flight center for the California Highway Patrol, Redding may find that public safety will also be compromised.

From the business perspective, our Redding employees make more than 1,500 trips annually from the Redding Municipal Airport. We cannot continue to operate from this location if our employees feel their personal safety is at risk. Part of our business is aerial photography, which also requires accurate weather forecasting to maintain profitable operation.

CH2M HILL Redding Office 2525 Airpark Drive Redding, California 96001-2443 916 243 5831
P.O. Box 492478 Redding, California 96049-2478 Fax 916 243 1654

Because of these grave concerns regarding public safety and the viability of our North State economy, we request that you improve weather forecasting services by keeping the Redding office open and adding a NEXRAD station in the Redding/Red Bluff area.

Thank you for your consideration.

Sincerely,

CH2M HILL

Anne L. Kernkamp

Anne L. Kernkamp, P.E.
Vice President

lb/1001432F.DOC
cc: Robert C. Anderson, Mayor, City of Redding
Stanley A. Smith/CH2M HILL, Sacramento

C: City Manager

Mercy Medical Center Mt. Shasta

December 12, 1994

RECEIVED
DEC 13 1994
CITY CLERK'S OFFICE

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

I am writing this letter to express the concerns of Mercy Medical Center Mt. Shasta regarding the possible closure of the weather station in Redding.

Mercy Medical Center Mt. Shasta is located in Siskiyou County and depends on air ambulances to transport our critically ill or injured patients. The closure and/or reduction in services of the Redding Weather Station will impair the well being of our patients.

On behalf of Mercy Medical Center Mt. Shasta I urge you to retain the Redding Weather Station.

Sincerely,

James R. Hoss

JAMES R. HOSS
President

JRH:ss

cc: Robert C. Anderson, Mayor
Redding, CA 96001-3396

914 Pine Street
P.O. Box 239
Mt. Shasta, CA 96067
(916) 926-6111

A Division of Catholic Healthcare West

City Manager

CITY OF RED BLUFF

555 Washington Street Post Office Box 400 Red Bluff, California 96080 (916) 527-2605

December 12, 1994

RECEIVED
DEC 13 1994
CITY CLERK'S OFFICE

Ms. Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, MD 20910

Dear Ms. Scanlon:

We have been informed that the weather station in Redding, California, may be closed by the National Weather Service in the near future. In addition, I understand that the National Weather Service plans to install Next Generation Radar (NEXRAD) stations at Sacramento, Eureka, Medford and Reno.

The City of Red Bluff was promised enhanced weather service when the local weather service office was consolidated with Redding. Now, it appears that the Redding office will be closed and forecasting moved to Sacramento.

Red Bluff is located at the southerly end of the transportation corridor that links California with Oregon and Washington. Interstate 5 is a strategic route for interstate commerce and safe travel, which depends on weather warnings and alerts from the local weather station to protect lives, commerce, and property. Red Bluff is an agricultural community where weather information for farmers must be timely and accurate. In addition, Red Bluff, Anderson, and Redding are the hub for a mountainous six county region in northern California which attracts a large number of tourists. The tourists, year-round, depend upon warnings and alerts that are generated by the weather service office.

Red Bluff is outside the effective range of the NEXRAD site in Davis, therefore, that tool cannot be used to generate real time weather information.

I urge you to support the location of the NEXRAD in close proximity to Red Bluff, Redding, or Anderson where appropriate protection of Northern California will be assured.

Sincerely,

Dennis W. Fischer

DENNIS W. FISCHER
City Manager

DWF:sme

cc: Robert C. Anderson, City of Redding ✓

c:\cm\c\NEXRAD ltr

C: City Manager

REDDING
MEDICAL
CENTER

December 12, 1994

RECEIVED
DEC 15 1994
CITY CLERK'S OFFICE

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

Redding Medical Center operates a twin engine helicopter and a twin turbine Cessna Conquest to transport ill patients as part of our community's air ambulance service. We transport 600 to 700 critically ill patients annually from remote locations and small hospitals.

Currently, pilots receive real time weather for our local area through the Flight Service Station in Red Bluff from 6:00 a.m. until 10:00 p.m. daily, and from the Redding National Weather Service 24 hours a day. If the Redding weather station closes, pilots would have no way to get accurate weather conditions for this area during the hours that the Red Bluff FSS is closed. The Red Bluff FSS is scheduled for closure in 1995. This would result in our inability to ascertain any weather conditions below 10,000 feet.

If this weather station is closed, the following issues would negatively impact our ability to provide safe air ambulance service for the following reasons:

1. Redding Medical Center's helicopter service flies under Federal Aviation Regulation (FAR) Part 135 day and night. These regulations require pilots to obtain real time weather conditions and forecasts for each patient flight when flying under Instrument Flight Regulation (IFT).

   Without the Red Bluff and Redding FSS, we would be unable to transport in adverse weather conditions. Now, due to FSS assistance, we are consistently updated regarding weather conditions which enables us to select the appropriate route, resulting in a safe journey for flight crew and patients.

PO Box 496072
1100 Butte Street
Redding, California 96049-6072
916 244-5400

2. If the Redding and Red Bluff FSS are closed, the only weather conditions available for our medical flight service would be from Sacramento, Eureka, Medford, etc., which provide weather conditions above 10,000 feet and of no benefit to 95 percent of our flights.

3. Without precise weather information, there will be times that the aeromedical pilot may refuse a critical patient flight because of perceived bad weather. The flight may have been scheduled had accurate weather information been available from a local weather station.

Flight safety and our ability to continue serving our community's health care needs will be seriously jeopardized without the ability for the pilots to get real time weather information for our local area.

Sincerely,

Steve Corbeil
Chief Executive Officer

ky

Northern California
EMERGENCY MEDICAL SERVICES, INC.
P.O. BOX 491989 ■ REDDING, CALIFORNIA 96049-1989 ■ PHONE (916) 221-7900
FAX (916) 221-7544

INFORMATION ONLY

RECEIVED
DEC 12 1994
CITY CLERK'S OFFICE

December 9, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

Northern California Emergency Medical Services, Inc., supports maintaining the weather office at the Redding Municipal Airport and the establishment of a NEXRAD unit in the Red Bluff, Tehama County area. Nor-Cal EMS is an 11 county emergency medical services regulatory agency. Without the existence of these services, weather data in our area will suffer.

The concerns of this agency are based on the needs of air ambulance operations based in the Redding area and their ability to obtain timely and accurate weather information. Without this information, responses by both fixed wing and rotary wing aircraft will be delayed, resulting in compromised patient care.

Respecting the emergent needs of patients in our area, which covers 20% of the state's geography, we urge you to keep the Redding weather office and establish the NEXRAD unit.

Thank you for considering our position

Sincerely,

Jack L. Becker
Chief Executive Officer

JLB cc

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DEC 12 1994
CITY CLERK'S OFFICE

SHASTA COUNTY
DEPARTMENT OF RESOURCE MANAGEMENT
Russ Mull, R.E.H.S.
Director

☐ ENVIRONMENTAL HEALTH DIVISION
James Smith, R.E.H.S.
Division Manager
1840 West Street
Redding, CA 96001
(916) 225-6767
FAX (916) 225-5607

☐ PLANNING DIVISION
James Cook
Division Manager
1855 Placer Street
Redding, CA 96001
(916) 225-5532
FAX (916) 245-6466

☐ BUILDING DIVISION
Ralph S. Overbey
Division Manager
1855 Placer Street
Redding, CA 96001
(916) 225-5761
FAX (916) 245-6466

☒ AIR QUALITY MGMT DIST
R. Michael Kussow, P.E.
Air Pollution Control Officer
1826 Butte Street
Redding, CA 96001
(916) 225-5674
FAX (916) 225-5237

☐ ADMINISTRATION
1840 West Street
Redding, CA 96001
(916) 225-6787
FAX (916) 225-5807

December 9, 1994

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

RE: Potential Closing of Redding, CA, National Weather Service Office

Dear Ms. Scanlon:

It is my understanding that the Department of Commerce has established a 60-day comment period that ends January 6, 1995 for receiving public input on plans to close certain local weather offices. I would like to encourage the National Weather Service to keep the weather office at the Redding Municipal Airport open and capable of serving our area.

The Shasta County Air Quality Management District relies on accurate meteorologic data provided by this office to accomplish the following mandated duties related to ambient air quality and public health concerns:

1) Burn day determinations and appropriate restrictions depending on elevation and local weather conditions within the County. Due to the mountainous terrain and high number of inversions, accurate local data is critical in these determinations.

2) Prediction of ozone exceedance days which are significantly dependent upon local summer weather conditions. Advisories to reduce vehicle trips are issued through the media and Caltrans vehicle count data is accessed in an effort to reduce emissions on poor air quality days.

3) Prediction of inhalable particulate matter (PM-10) exceedance days which are significantly dependent on local inversion conditions during winter months. Starting in November of each year our office implements a woodstove use curtailment program based on predicted local weather conditions.

4) Investigation of complaints regarding fallout of fugitive emissions from upwind sources of pollutants. Accurate local wind conditions are necessary for this program.

Julie Scanlon
December 9, 1994
Page 2

We believe that a reliable and complete weather station in the Redding area is essential to fulfilling the above responsibilities.

We also are concerned that a loss of local weather forecasting will compromise our proactive efforts to avoid reclassification as a Federal non-attainment area for ozone. Unlike other areas in California, the Redding area ozone problems are limited to a few days each year that usually can be predicted if accurate local forecasting of weather conditions is retained.

Please advise me of any supportive actions this agency can take in assisting efforts to maintain this valuable service in the Redding area.

Sincerely,

R. Michael Kussow

R. Michael Kussow, P.E.
Air Pollution Control Officer

RMK:pat

c: Robert C. Anderson, Mayor
City of Redding

letters\city-rdg\scanlon.ltr

CITY OF SHASTA LAKE

December 8, 1994

RECEIVED
DEC 1[illegible] 1994
CITY CLERK'S OFFICE

Julie Scanlon
National Weather Service
East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

The City of Shasta Lake, comprised of approximately 11,000 residents, has been concerned with the possibility that the National Weather Service may close the Redding, California, weather station. Further, I understand that the National Weather Service plans to install Next Generation Radar (NEXRAD) stations in Sacramento, Eureka, Medford, and Reno.

I believe that the proposed change will drastically affect the City of Shasta Lake since our area has micro-climatic severe weather patterns. The City of Shasta Lake is adjacent to Shasta Dam, which is the cornerstone of the Central Valley Project. The Central Valley Project is important to all of California due to flood control, agricultural irrigation storage, San Francisco Delta environmental, domestic water, and electric power operations for a major part of California. The storm run-off information from Cascade, Sierra, Trinity, Warner, and Siskiyou Mountain ranges requires immediate action by safety officials and United States Bureau of Reclamation and Western Area Power Agency operations crews to avert major operation crises. In addition, Shasta Lake is located at the southerly end of the transportation corridor that links California with Oregon and Washington. Interstate Highway 5 is a strategic route for interstate commerce and safe travel which depends upon weather warnings and immediate alerts from the local weather station to protect lives, commerce, and property. Finally, Shasta Lake, Redding, Anderson, and Shasta County is the hub for a mountainous six county region which attracts a large number of tourists. The tourists, year-round, depend upon forecasts and alerts that pertain to boating, hunting, hiking, skiing, and fishing recreational areas.

Consequently, I urge that you support the location of NEXRAD in close proximity to Shasta Lake, Redding, Anderson, or Red Bluff so that appropriate protection can be assured to Northern California.

Very truly yours,

Ronald G Young

Ronald G Young,
City Manager

1650 Stanton Drive / P.O. Box 777 / Shasta Lake, CA 96019 / (916) 275-7400 / FAX (916) 275-7414

c. Council
City Manage

NORCAL
FISHING GUIDES AND SPORTSMEN'S ASSOCIATION
P.O. Box 492063
Redding, CA 96049-2063
Phone (916) 244-5040 • Fax (916) 244-1039

December 07, 1994

RECEIVED
DEC 08 1994
CITY CLERK'S OFFICE
BY ____________

% Julie Scanlon
National Weather Service
1325 East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms Scanlon:

We are writing you this letter in support of the City of Redding's proposal that the National Weather Service build a NEXRAD station in Red Bluff Ca. and keep the weather station at Redding, Ca..

We feel that the current plan of the National Weather Service is not adequate to provide the information regarding the weather for the protection of the people in Northern California.

Shasta Dam of the CVP Project and Oroville Dam of the State Water Project the two largest projects in California, that control most of the water used by the people of the State, rely on the weather projections to determine the amount of water being released and stored. Without accurate data it is impossible to regulate the water in such a manner to get its best beneficial use.

We have four runs of chinook salmon in the Sacramento River system and they are all in trouble, because of the past poor use of water. The Winter-Run of Salmon is listed by the Federal Government as endangered, the Spring-Run has been proposed for listing as threatened or endangered, the other two run are now being considered to be proposed to be listed as threatened or endangered. As you can see from the above the Salmon fishery in the Sacramento River is in big trouble and needs the assurance of an adequate water supply.

We feel that a NEXRAD at Red Bluff Ca. would cover all of Northern California under the 10,000 foot level and provide us with the answers that are needed for Flood Control, Irrigation, Fishery, Industrial and Municipal use.

The National Weather Service promised the people of Northern California when it closed down the weather station in Red Bluff and Mt. Shasta, that the weather station in Redding would be a permanent full service office. Now its looks like another case of the government not keeping its word to the taxpayers.

We again urge you to reconsider your proposal and put a NEXARD at Red Bluff Ca. and the Weather Station at Redding Ca.

Sincerely

Shel Meyer

Shel Meyer
President

CC: Congressman Wally Herger
Congressman Vic Fazio
Mayor Robert Anderson

City of Redding

CITY COUNCIL
Robert C. Anderson, Mayor
Patricia A. Anderson
David A. Kehoe
David L. McGeorge
Ken Murray

December 9, 1994
A-090-100-935

Ms. Julie Scanlon
National Weather Service
1325 East-West Highway #9372
Silver Spring, Maryland 20910

Dear Ms. Scanlon:

It is a pleasure to submit the attached material in support of the position which the City of Redding and many other interested parties in this region have taken over the past several years with regard to NEXRAD and the local office of the National Weather Service. The attached material represents an update of the material which we presented in Washington D.C. to various officials of the National Weather Service, the U.S. Congress and the White House several months ago. Some of the material has been updated and we have provided a very important supplemental report on the impacts which we believe will be most damaging to this region should the National Weather Service modernization plan go forward as announced.

It is a supreme irony that a worthwhile, well-founded plan for modernizing the National Weather Service should have inherent in its content a degradation of service to this region. An area of the size of the state of Maryland essentially will be without the benefits of NEXRAD and even the benefits of a local weather station will be impaired if the modernization plan goes forward. This is due to the fact, which we have stressed on many occasions in the past, that the topography of this region, with mountains surrounding the city of Redding and environs, is such that weather phenomenon lower than 10,000 to 15,000 feet in this valley may be essentially undetected by NEXRAD, if the installation is not appropriately located. We have demonstrated clearly in the past that the installation on the coast and the one in Oregon as well as the one in Nevada simply do not cover this valley and that the Beale Air Force Base installation is inadequate to cover this region, both because it has a military mission and is poorly located with respect to its ability to "see" up the canyon, where significant weather phenomenon originate.

We respectfully reemphasize our point that there will not be adequate service for agriculture, water management, flood control, and fire interests, air ambulance service, commercial and general aviation and that some of these shortcomings literally represent matters of life and death. In addition, the absence of NEXRAD coverage for the Federal Central Valley Project

760 PARKVIEW AVENUE, REDDING, CA 96001-3396 • P.O. BOX 496071, 96049-6071 • (916) 225-4000

and the State Water Project seriously shortchanges the massive Federal and State investment in these facilities. We are most concerned that these facts will not become evident until the local weather station is eliminated and that the NEXRAD installation is irrevocably located at a less-than optimum site. We believe that the Congressional mandate to ensure that there will be no degradation in service is not being met, and the attached report bears additional witness to that significant flaw in the plan.

We have been informed today that the NEXRAD installation scheduled for Beale Air Force Base has been delayed by serious environmental problems to sometime in 1996. Should it be necessary to re-site the Beale NEXRAD, it may seriously impact the coverage to this area.

On behalf of the many concerned interests of this region, we urge reconsideration of the National Weather Service plan for modernization as it pertains to this region, and we sincerely hope that a more appropriate plan will be developed that satisfies the intent of Congress. We pledge our cooperation in working toward a constructive solution to this problem.

Very truly yours,

Robert C. Anderson
Mayor

mayr448.rca/ga
Attachments
c: Congressman Wally Herger
Congressman Vic Fazio
Congressman John Doolittle
Governor Pete Wilson
Senator Dianne Feinstein
Senator Barbara Boxer
Del Smith, E. Del Smith & Co.
Marsha Scott, Deputy Assistant to
the President

Table of Contents

1. Report entitled, "NEXRAD Coverage of Northern California"

2. Copy of Report Submitted to Secretary of Commerce Ron Brown with additional letters and news media articles received subsequent to original submission. This report contains:

   A. Letter to Secretary of Commerce Ron Brown

   B. List of NEXRAD Task Force Members

   C. Representative Letters regarding importance of adequate weather information to North Sacramento Valley, California, from federal, state and community organizations

   D. News Media Coverage

   E. Exhibit 1, "Weather Radar Coverage Assessment Map"

NEXRAD COVERAGE
OF
NORTHERN CALIFORNIA

CITY OF REDDING
DECEMBER 7, 1994

NORTHERN CALIFORNIA & NEXRAD

The City of Redding and the communities of the Northern Sacramento Valley have voiced concerns about the National Weather Service (NWS) Modernization and Restructuring (MAR) since the late 1980's. In 1986 the weather offices at Mt. Shasta, Red Bluff, and Redding were consolidated into one office at Redding. At that time the NWS assured the cities that by doing this they would have one permanent, full service office, in the north valley. This was an outright lie. The NWS knew what their plans were under MAR, and by consolidating the offices they would only have to close one office instead of three.

The North Valley tried to plead their case to the NWS but were ignored. Finally, in 1994 the North Valley Task Force was formed. Composed of interested and affected agencies the Task Force received briefings from Chris Fontana, Meteorologist In Charge of the Redding Weather Office, and Norman Hoffmann, Area Manager for Northern California. The Task Force was not only composed of private and public agencies but also had on it, a retired NWS meteorologist who had been in charge of the Eureka and Sacramento offices, and an engineer who had worked for SRI on the sitings of the NEXRADs. The Task Force studied the National Weather Service MAR Plan and compiled a report based on it's findings, and in July of 1994 a delegation went to Washington to present the report to the White House, Congress, and the National Weather Service. A copy of the report is attached along with the endorsements it has received.

The current NWS office in Redding serves 9 northern counties in California and is the largest office proposed for closure under MAR west of the Rockies. Some of the areas the Task Force felt the NWS MAR failed to consider were:

1. The complex climate of the area.
2. The size of the population area in the North Valley.
3. The failure of the proposed NEXRAD grid to provide "FULL coverage to this area.
4. The NEXRADs performance in the types of precipitation patterns that are critical to the area.
5. The failure of the NWS to deal honesty with the communities of the Northern Sacramento Valley.

The following is an explanation of these 5 items and then a look at how the failure to provide adequate weather services will affect the Northern Sacramento Valley.

CLIMATE OF THE AREA:

Redding is located at the north end of the Sacramento Valley. The annual rainfall increases from 33 inches at the Redding Airport to 80 to 90 inches twenty miles north, at the upper end of Shasta lake. In this 20 mile area is the largest population center in California, north of Sacramento; Shasta Lake, one of the largest lakes in California, which is also a major recreation area; and the intersection of three major highways. This strong precipitation gradient is caused by the shape of the north valley. Convergence and topographic lift occur during the strong southerly winds that precede Pacific frontal systems. The topography of the Northern Sacramento Valley, and the Sacramento River Canyon north of Redding, also traps cold air during the winter and results in heavy snow at low elevations. This has been documented in several technical papers (NWS Western Region Technical Attachments 80-4 and 82-6) and has resulted in the closure of Interstate 5 which runs northward from Redding through the Sacramento River Canyon. During the winter of 1992-93 this area received over 3 feet of snow in less than 24 hours during one of these trapped cold air events,

POPULATION OF THE NORTH VALLEY:

The Redding area is the largest population center in California north of Sacramento. It is also the hub city for the communities of Sisikiyou, Trinity, Tehama, and Shasta Counties. Because of the varied climate the citizens of these areas depend on accurate and timely weather information for travel and enterprise. Until 1986 there were 3 weather offices providing information to this area. In 1986 the NWS closed the Red Bluff and Mt. Shasta offices and promised they would maintain a 24 hour, full service office, at Redding.

NEXRAD COVERAGE AND PERFORMANCE:

The NWS provided the Redding task force with a copy of its NEXRAD 10,000 foot coverage map. However, this map is 10,000 feet above the height of the radar. The Medford radar is on a mountain peak at an elevation above 7,000 feet and therefore its beam is 17,000 feet above the Shasta Lake basin instead of 10,000 feet. The Eureka radar will be blocked from reaching the critical precipitation areas along the I-5 corridor from northern Redding to the city of Mt. Shasta by the Trinity Alps (Elev. 9000 to 10,000 feet). The Sacramento radar is over 120 NM. away which is too far south. The Reno radar is too far away and is on a peak that is over 8000 feet high.

The City of Redding, using its GIS system, developed a map showing 10,000 feet AGL coverage of northern California. A copy of the map is in the Task Force report attached to this document. After receiving the map and the Task Force evaluation of the proposed NEXRAD coverage, the NWS admitted that the Redding area and the I-5 corridor, could only receive coverage from the Dept.

of Defense NEXRAD that Beale AFB is installing near Oroville, some 80 NM. south of Redding. Further, the NWS has stated that until the Beale NEXRAD is installed and commissioned, no county warnings services will be transferred from the Redding Weather Office to the Sacramento Weather Office.

In its original Strategic Plan the NWS stated that the Sacramento NEXRAD would provide adequate service to the north valley. They have now admitted this was wrong, and are attempting to use the Beale AFB NEXRAD as a fall back position to cover the north valley. In an attempt to placate the north valley residents, the NWS provided the Task Force with a cross section of the Beale AFB radar beam illustrating the elevation of the beam as it passed over Redding. The azimuth selected for the illustration conveniently missed the foothills that jut out into the Sacramento Valley between Oroville and the areas north of Redding, thus allowing a lower scan than would be possible to the north of the city along the I-5 corridor and the Shasta Lake basin. But, even using the NWS cross section, the center of the radar beam is 12,000 to 15,000 feet above ground level when it scans the heavy precipitation area north of Redding and the headwaters above Shasta Dam.

The NEXRAD's and the current WSR-57 radar's give adequate coverage of convective precipitation. However, stratified cold winter type precipitation usually orographic and below 10,000 feet, goes undetected by the current Sacramento and Medford radar's. The Redding WSO has documented several heavy precipitation events that went almost undetected on the WSR-57 radar's.

These events are associated with the strong southerly winds preceding fronts. In one event, rain was reported for 37 hours at the Redding airport with light to moderate and occasionally heavy precipitation. During this period the Redding Airport received over 3 inches of rain while more than 5 inches fell in the headwaters of Shasta Lake. During the 37 hour period the Medford and Sacramento Radar's showed precipitation 4 to 6 hours.

In August of 1976 over 8 inches of rain fell in Redding, during one of these strong southerly flow occurrences. This still holds the record for the heaviest 24 hour rainfall for August in California. In March of 1993 another of these strong southerly wind events caused major flooding in North Redding.

While the NEXRAD has performed well with convective precipitation, it has badly underestimated cold, small droplet, stratified precipitation like that which occurs in this area. In the recent heavy rains in the San Francisco Bay area the radar showed an inch of precipitation in areas that received over 10 inches. Because the dynamics of the heavy precipitation north of Redding occurs in the lower levels(below 10,000 feet) of the atmosphere even the Beale radar will not provide adequate coverage.

Finally, the NWS believes the Beale radar will provide adequate coverage of the north valley. Does the NWS mean reflectivity coverage ?(range 240 NM); or will this area receive the full benefits of the NEXRAD which includes low level winds, inversions, and precipitation amounts (range 124 NM). For true adequate radar coverage to occur a NEXRAD should be installed in the Red Bluff area, which would then provide low level coverage of the north valley and the headwaters of Shasta Lake.

PAST NWS PROMISES-In 1986 the NWS closed the Weather Offices at Red Bluff and Mt. Shasta. In doing this they promised that the Redding office would be a 24 hour a day full service office. However, the NWS Strategic Plan did not provide for a Redding office. The NWS admitted this but has said since the plan was not approved by Congress until 1989 they couldn't reveal it to the cities of the north valley.

The following is a discussion of how a NEXRAD and the continuation of a full service weather office in Redding would benefit Northern California.

WATER MANAGEMENT IN THE NORTH STATE

The two major water projects in California are anchored by major dams and fed by mountainous watersheds with poor meteorological coverage. The Federal Central Valley Project stores the bulk of its water (4.5 million acre feet) behind Shasta Dam and is fed by the Pit, McCloud, and Sacramento Rivers. The state stores the bulk of it's water behind Oroville Dam (3.5 million acre feet) and is fed by the Feather River.

"The combined projects stand as the greatest system for controlling and transporting water the world has ever known."[1]

Because of increased water demand from an expanding population, and new efforts to protect and restore fisheries, the two severe droughts in the past 20 years have brought this system under severe pressure to increase its water storage capacity and continue to prevent floods. The greatest impediment to the management of both systems is good weather support in the form of accurate QPF's (Quantitative Precipitation Forecasts) and accurate storm totals from the Weather Service forecasters and NEXRAD.

The placement of a NEXRAD at Red Bluff will cover both watersheds from the surface to well above 10,000 feet, and enhance the ability of the Weather Service to provide accurate short term forecasts and accurate storm totals to the Bureau of Reclamation and the State Water Project. With the present proposed configuration it is impossible to provide the same accuracy in the observation of storm totals and possibly of the forecasts. The distance of the Davis radar from the Feather River Basin above the Oroville dam, makes it unlikely the Davis NEXRAD will be able to achieve the same accuracy as a much closer radar at Red Bluff.

The statement from Dr. Hudlow of the Office of Hydrology, illustrates how he envisions the PPS (Precipitation Processing Subsystem) designed for NEXRAD will work and evolve in the field.

> "The system has been designed in a very robust manner. It is designed with, what is called, site and system adaptation parameters, in the terminology of the NEXRAD folks, which means we have built a framework, a basic framework, that is not perfect by any means and it will continue to need refinement, continue to need improvements that can be gleaned by experience from the field forecasters by looking at different types of weather situations. But the framework is there to adapt the system to any Climatological area, any type of terrain conditions without a total redesign of the software system.
>
> Now having said that, the corollary to this is: in order to get the best out of that software system at each site means that the local expertise will have to be brought to bear both in the definition of all the parameters that are contained within the software system and, also, in the interpretation and use of the data and information coming from the system together with other information available at each individual site." 2

A NEXRAD positioned at Red Bluff, and a Forecast Office in Redding will best support the water agencies in the north state. With this support there is the ability to increase water storage and increase the ability of water managers to control and manage the amount of water delivered to each program in the Central Valley Project.

The following pages give a brief account of the impact additional water storage will have on the Central Valley Project and the major programs it supports:

1) Central Valley Project
2) Agricultural Water
3) Fisheries
4) Flood Control
5) Hazmat Management
6) Hydropower

The final argument " WSR-88D and Water Management" is a brief discussion of why the present configuration of radar coverage needs to be changed to support the Federal Central Valley Project and the State Water Project.

AGRICULTURAL WATER

The river basins behind the Shasta-Trinity Complex of dams and Oroville Dam provide all the water for the Federal and State water projects. These projects provide agricultural water for the whole of the CVP (Central Valley Project), plus municipal and industrial water for the eastern portion of the San Francisco Bay Area, and the State Water Project's exports to Southern California. About half of the CVP water is contracted to the state for use in coastal and Southern California, including the San Joaquin Valley.

The ability of the NEXRAD to accurately measure storm totals over the basins, and the looked for improvement in forecasting rainfall amounts, could lead to an increased water supply in the Federal and State Water Projects. Even incremental improvements are significant given the volume of water involved. Each 1% improvement of storage in these reservoirs would yield up to 83,000 acre feet.

Economically, these sums are highly significant. Agriculture supports roughly 1 in 10 jobs in California and provides 9.1 percent of the Gross State Product. Moreover, California's agricultural exports contribute significantly to the national balance of payments. California crops that have major influences on U.S. markets alone are valued at over $6.7 billion.[3] The value of crops irrigated with CVP water alone is $3.4 billion.[4]

FISHERIES BENEFITS

A NEXRAD at Red Bluff would cover all of the Chinook salmon spawning habitat in the main stem of the Sacramento River, the preservation of which is a major drive of water management in California under The Endangered Species Act. A Red Bluff NEXRAD would cover the source regions for water for all the spawning habitat of the endangered winter run, as well as that of the Spring-run Chinook, which is a potential candidate for listing as threatened or endangered. In all, virtually all of the spawning habitat of three of the four runs of Chinook Salmon in the Central Valley of California, would be covered only by a Red Bluff NEXRAD. Together, NEXRADs at Red Bluff and Davis would cover all spawning areas now used by the four runs.

These salmon, spawning in the Sacramento River support essentially the whole of the salmon fishery south of San Francisco and the major portion of the salmon fishery along the California Coast north of San Francisco to the Oregon border.

FLOOD CONTROL/WARNING

A NEXRAD at Red Bluff would cover the flood prone, undamed streams of the west side of the Sacramento River Valley, particularly Cottonwood, Elder, and Thomes Creek, as well as the more orderly, but more numerous streams of the east side, such as Butte, Big and Little Chico, Deer, Mill, Battle, Antelope, and Cow Creeks.

These are streams which are in essence undamed for flood control purposes and have the potential for flooding portions of Chico, and portions of the development associated with the proposed town of Celebrity City, Cottonwood and Vina. A NEXRAD at Red Bluff would also provide good coverage of Stony Creek, a tributary which has been dammed to protect the City of Orland and wholly supports the Orland Project, the water source for the Orland-Artois Irrigation District. These streams are also capable of substantially increasing the flows in the Sacramento River for short periods, giving them the potential for contributing to flooding downstream on the mainstem of the Sacramento, and creating threats to Anderson, Red Bluff, and Hamilton City.

With a Red Bluff NEXRAD monitoring the precipitation in the Shasta Basin and delivering real-time precipitation amounts on an hourly and three-hourly basis, it is possible to manage the releases from Shasta and Keswick Dams to coincide with periods of low flow in the tributaries of the Sacramento River.

I realize planned releases from Shasta and Keswick Dams is what is done at present, but it is done with reliance on a system of widely spaced rain gages that represent many square miles with a few point collection sources. To represent the entire basin the gages are given weighted values for the square miles of the basin they represent. It is therefore possible for one 10 inch rain gage to represent a 10 x 10 nm grid or 100 sq. miles. Contrast this with the ability of the NEXRAD to display hourly, three-hourly, or storm total precipitation on a 1.1 x 1.1 nm grid or 1.21 sq. miles.

The rain gage method of measurement is especially suspect when it is windy, as is usually the case in moderate or heavy precipitation. Also, most telemetered gages today are of the tipping bucket type with a tendency to give false readings in heavy rain and strong winds. Another fault of the point gage is that it requires a lengthy correlation period if the gage must be moved or if vegetation growth begins to impact the catch.[5]

The technological advances in meteorology have been spectacular in the past 30 years. We now have the ability, through satellite imagery and sensing, coupled with computer modeling, to measure and forecast the movement of weather systems as never before. But, the satellites and computer modeling techniques deal with the weather on a very large or synoptic scale while the NEXRAD deals with the weather on a meso or local scale. In other words, the NEXRAD is one more piece of technology that enables the meteorologist to forecast and measure local events with increasing accuracy. Dr. Michael J. Hudlow of the Office of Hydrology believes the Next Generation Weather Radar will provide better spatial coverage and measurement of precipitation.[6]

HAZMAT MANAGEMENT

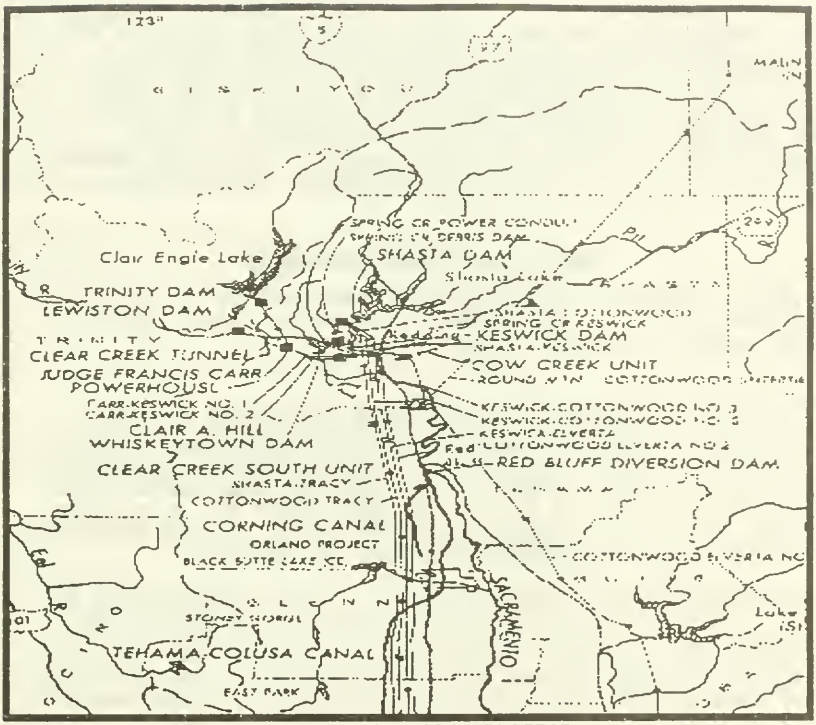
A Red Bluff NEXRAD would give unique coverage of the Spring Creek watershed, a stream in which flooding has special significance because it drains the Iron Mountain Mine Superfund Site, the nation's largest. This source of heavy- metal laden acid drains in to Keswick Reservoir just upstream of the Keswick Dam, and thus has the potential to impact the prime salmon spawning grounds in the Sacramento Valley as well as the drinking water supply for Sacramento and other cities which draw drinking water from the river. Accurate, real-time data would enhance management of this pollution source which is currently handled by dilution with waters from the Trinity River and Clear Creek drainage's' or releases from Shasta Reservoir, water stocks that have considerable value for irrigation and power and temperature control. Availability of better meteorological data offers the potential for better management of the release of the acid wastes to minimize spills and optimize the use of waters release for dilution.

HYDROPOWER

The Bureau of Reclamation's Central Valley Project operates 11 hydroelectric power plants that generate over 5,000,000,000 kWh in an average water year. The net generation in 1992 was 2,091,314,228 kWh of which 1,505,325,716 kWh, or 3/4 of the total power, was generated by the water impounded by dams that would be under the direct surveillance of a Red Bluff NEXRAD.

The ability to increase storage to a maximum will translate into the maximum amount of power generated, and a maximum savings in fossil fuel along with a maximum revenue returned to the treasury. In 1992 surplus power brought a total of $4.1 million to the treasury, while in 1991 the treasury received $13.5 million from surplus power generation.

The current NEXRAD configuration samples storms at elevations greater that 10,000 ft. over the northern basins and totally misses the low level orographic precipitation that delivers the mass of rainfall that fills the dams. The proposed coverage will lend no support to the management and storage of water in the north state.



THE CENTRAL VALLEY PROJECT

The complexity of the Central Valley Project (CVP) is illustrated in the sketch above showing the various lakes, dams, powerhouses, rivers, and canals in which water is stored and moved south. This area is well beyond the range of the Sacramento NEXRAD, and well below the 10,000 ft. plus scan of the Medford, Eureka, and Reno NEXRADS.

The CVP was developed to protect the Sacramento Valley from flood and to store much needed water to support a growing agricultural economy. The threat of flood remains with us although under control, but the twin problems: flood control and maximum water storage, demand careful planing and constant measurement and observation to meet these goals.

The NEXRAD is the latest and most versatile of the Weather Service's observation tools, and has the ability to provide real-time precipitation data to the Bureau of Reclamation to assist in balancing the maximum water storage against the threat of flood. Unfortunately, the present configuration of NEXRAD's will overshoot the target precipitation in the Shasta and Trinity basins, and the opportunity to provide a desperately needed service will be lost. The threat of flood will be enhanced, and the decision making ability of the dam managers will be compromised and all because of the lack of a low level NEXRAD in the north valley that could scan the basins in the manner envisioned by the designers of the system.

WSR-88D and WATER MANAGEMENT

Without a NEXRAD in the North Valley the state of California will be giving away it's best chance to augment an already dwindling water supply with better water management.

The most populous state in the nation is short of water. Agriculture, industry, and people have felt the pinch from two multi-year droughts in the past 20 years. Agriculture lost 20% of it's traditional water supply in 1992 and urban dwellers and industry pay higher rates for the water they use. The economic impact to the state is felt in the meter rates and in the food prices. The cost to the nation may well be in reduced agriculture products as well as higher prices for the products.

California is educating its citizens in water conservation and water economics. Farmers are encouraged to sell their water to the cities and to plant fewer water hungry crops like rice and tomatoes. In an attempt to continue to produce as they have in the past many farmers have sunk wells. The result is the aquifers that underlie the Central Valley are drying up and collapsing as more and more water is taken from the ground. Without a recharge of water almost 20 million acre feet of the aquifer has collapsed and is now lost forever as water storage.

The Central Valley Project provides water from Redding to Bakersfield and, Shasta Dam, with a maximum capacity of 4.5 million acre feet, is the main provider of the water.
The ability of the WSR-88D (NEXRAD) to detect and quantify rainfall over a vast area was recognized by Dr. Michael Hudlow of the Office of Hydrology.

" Probably the most critical variable for hydrologic forecasting is the precipitation input to the forecast procedure. And so it's one of the most difficult variables to measure. It's highly variable in space and time. Hydrologists the world over recognized this as being a serious limitation. And therefore the radar offered a promise of being able to provide the kinds of rainfall information that could substantially, in fact, revolutionize hydrologic forecasting if the accuracies could be achieved."[7]

The present proposed radar coverage will scan an area 10,000 feet and more **above** the Shasta Lake watershed. Coverage at this elevation will only detect snow - not rain. The torrential dam-filling rains that take place with Southwest Flow Aloft occur below the freezing level which is usually near 10,000 feet. Other storms from the Northwest Pacific average freezing levels between 3,000 and 5,000 feet during the fall and winter wet season and the WSR-88D data that are the basis for the estimate of precipitation, are accumulated through a scan of 9 levels from 0.5 to 19.5 degrees elevation It is obvious the rain that falls below 10,000 feet will be missing from the scans. **Yet this is the most important portion of the data.**

Without an accurate low level scan the Z/R (Reflectivity/ Rainfall) relationship will be useless, and the Bureau of Reclamation will be denied data that would substantially enhance their ability to manage the releases from the most important dam in the state.

It is not only the potential for flooding that will be impacted, but the ability to store the maximum amount of water also.

In a state that has already seen two major droughts in the past 20 years it is unthinkable that meteorological support to the Bureau of Reclamation is not one of the prime uses of the NEXRAD: For without data you cannot supply the support.

The Weather Service is charged with the protection of life and property and has constructed a modernized service around the WSR-88D network that will detect tornadoes, flash floods, severe thunderstorms, and hurricanes. However, the Weather Service seems to have forgotten the WSR-88D can also monitor rainfall with one and three hour totals as well as storm totals. And, accurate rainfall totals are the basis for a host of hydrologic operations from flood control to water storage. Support for Water storage and water management programs are what the state needs most from the Weather Service, and a NEXRAD located at Red Bluff to support the most important water supply in the state seems a fine way to start.

FORESTRY AND FIRE MANAGEMENT

The Redding Weather Office is located at the Northern California Service Center, which is the emergency response center for all forest fires and other disasters in Northern California. The Redding Weather Office provides the weather services to this center and operates one of the largest fire weather programs in the U.S. The main benefit the NEXRAD will provide the fire weather program is its ability to detect low level winds and temperature inversions. Because of their elevations and locations the only NEXRADs useful to the fire weather program will be the Hanford, Sacramento and Beale units. A radar in the Red Bluff area would provide this low level coverage to the forest areas of Northern California.

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[4] Page III-9, Table III-5 of USFWS, August 31, 1994, Environmental Assessment for the Dedication and Management of 800,000 acre-feet of Central Valley Project yield for fish, wildlife, and habitat restorati purposes.

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Letter to Secretary of Commerce Ron Brown

City of Redding

CITY COUNCIL
Robert C. Anderson, Mayor
Patricia A. Anderson
David A. Kehoe
David L. McGeorge
Ken Murray

May 6, 1994
A-090-100-935

The Honorable Ron Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street between Constitution
Avenue and "E" Street, NW
Washington, D.C. 20230

Dear Secretary Brown:

The City of Redding finds it necessary to bring to your attention a serious situation, relating to the need for an appropriate level of weather service in our region to address the needs of scheduled aircraft safety, general aviation safety, agricultural forecasting, interstate commerce, air ambulance service, Federal and State fire fighting, flood control, and a whole range of concerns relating to the general economy of the most northerly one-third of California and to some degree the State itself.

The problem, ironically, arises out of the "modernization" plan of the National Weather Service. While the overall objective of the plan is highly desirable, **its implementation will clearly result in a degradation of weather services, which is prohibited by Public Law 102-567.** This result will inevitably occur (although it probably could not be proven until it is too late) by virtue of the location of NEXRAD units and the fact that the National Weather Service station in Redding will be closed if it is not supporting a NEXRAD unit.

We were initially advised by the National Weather Service that NEXRAD units at Eureka, Medford and Reno would cover this region, and we pointed out that major mountain ranges (including Mt. Shasta, Mt. Lassen and the coast range) lie between these radars and the northern end of the Sacramento Valley. (Please see Exhibit 1) We believe that we finally made our point, as this contention has not been offered lately. We were then told that the NEXRAD unit at Sacramento would serve the northern valley, but the effective range of these units is about 125 miles, and Sacramento is 175 miles away from Redding, let alone the Sacramento River canyon and Siskiyou mountains to the north where much of the traumatic and dangerous weather seems to originate. (There is actually an **annual difference of about**

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50 inches of rainfall from the south end of Shasta Lake near Redding to the north end of the canyon, about 50 miles away).

When it became evident that the notion that the Sacramento unit would serve this region didn't wash, the next contention by the National Weather Service was that the region would be served by the Beale Air Force Base unit, which is not located at Beale Air Force Base but Oroville. It is our understanding that military units, such as the one at Oroville, have a military mission and that there is no assurance of the availability of weather information for civilian purposes. There have been some assertions to the contrary, but we have no definitive answer on this point. Our latest request for such assurances, a letter of April 15, 1994, to Dr. Joe Friday of the National Weather Service has so far been unanswered. If it is true that the military mission of DOD-owned units eclipses any civilian function -- and it is understandable that this would be the case -- the Beale unit is essentially non-existent for our purposes. (Indeed, what other explanation would there be for locating a military unit within 52 miles of a civilian unit at Sacramento or the multiple units overlapping in the Los Angeles area?)

This situation leaves 17,400 square miles in Northern California not covered by NEXRAD at all and with the threat, if not the absolute certainty, that our valued local station of the National Weather Service will close within a few years.

This will leave an intolerable and indeed life-threatening situation that will affect the general economy of the region, already reeling from disastrous cutbacks in the timber industry and other economic downturns. All manner of business, from lumbering giants such as Sierra Pacific to small businesses such as the Superior Balloon Company, are dependent upon reliable localized weather predictions.

Such a situation would also leave Mercy Medical Center and Redding Medical Center, which fly a combined 1,500 air-ambulance missions a year with fixed wing aircraft and helicopters, without information which is literally the difference between life and death. Every flight they make is critical to someone's life or they would not require an air ambulance. When weather information has to come from hundreds of miles away and lacks the local knowledge of the terrain and the micro-climates that are peculiar to the region, the patient, the crew and the aircraft are at risk. Surely, no economy measure is worth this price.

General aviation and scheduled air service are similarly affected. The City runs Redding Municipal Airport, which serves a 25,000 square mile area of Northern California and southern Oregon with scheduled air service, and Benton Airpark, our general aviation facility. Pilots who fly out of the airports have a keen appreciation for the service and information they receive, which is localized and accurate in contrast to the broad-brush forecasts from the larger weather centers. This is not to fault the larger centers: they do their best. There is just no way that a meteorologist in Redwood City can have the kind of localized knowledge that the meteorologists at the Redding Municipal Airport routinely possess and share with pilots.

Interstate commerce, a primary concern of your office, will also be adversely impacted by the loss of the National Weather Service at Redding Municipal Airport. Both Interstate-5 and the railroad, serving all of the West Coast from Seattle to San Diego, pass through a choke point in the northern Sacramento Valley, at altitudes that produce snow and other very adverse weather conditions. Accurate weather forecasting is essential to keeping these major arterials open, and the California Department of Transportation and the California Highway Patrol both have a major stake in such information, in order to provide emergency responses and in order to move snowplows and crews to areas where the need is the greatest in a timely manner. We were under the impression that the National Weather Service took such needs seriously and that NWS conducted a study of that question at the request of Congressman Wally Herger. We have never had the opportunity to review that study, if in fact it was ever made, despite our requesting a copy as recently as April 6.

Shasta Dam was built by the Federal government in 1939-1945 primarily to provide flood control and water supplies to much of California. Balancing the objective of impounding every drop of water to add to the sometimes scarce supply against the conflicting objective of maintaining sufficient freeboard to absorb the shock of sudden storms can be delicate, and the adequacy of weather forecasting ability is a key ingredient in the equation. If the call is wrong and the amount of inflow from the tributaries to Shasta Lake exceeds the capacity of the Sacramento River downstream from Shasta Dam, disastrous flooding can occur. One Federal agency, the Bureau of Reclamation, is assisted in its mandated duties by another Federal agency, the National Weather Service, and the importance of cooperative support is essential to the taxpayer and the State's economy.

Similarly, Federal and State air attack units dedicated to fighting wildland fires fly out of Redding Municipal Airport, and of course good weather information is essential to the risky close-support flying that these aircraft are required to do.

Agriculture obviously is also dependent upon effective weather forecasting, and of course California is the premiere agricultural state with much of our economy dependent upon agriculture and much of the rest of the country dependent in turn on the state of our agricultural economy. Agricultural interests have a high degree of concern over the potential loss of the local weather station.

Changes in demographics for this region, moreover, have been rather dramatic since the original NEXRAD stations were done in the 1980s. The Redding area is now the largest unprotected area in the largest state in the Union, and we believe you will agree that this situation must be corrected.

Without going into further detail, let it suffice to say that the weather forecasting service of NWS's local office is essential to these and many other segments of the State's economy. If it is true that weather stations that are not associated with NEXRAD units will be closed, we must pursue the location of a NEXRAD unit to serve this region. Whether that means that the location of the unit intended for Beale Air Force Base should be moved to a location where it can "see" into the Sacramento River canyon area or the redesignation of one of the "extra" units from Clark Air Force Base in the Philippines, or one assigned to a base being closed, or one of the 15 destined to become spare parts is open to question. We do need the National Weather Service local station or the service will clearly be degraded and there will be great potential loss of life and property due to this inadequacy.

So far the National Weather Service has been unable to address these concerns, and perhaps NWS lacks the authority to do anything more than it has been doing. It is for this reason that we have finally reluctantly concluded that it will be necessary to take this issue, however small it may seem in the total scheme of things, to the very highest authorities of the Federal government in order to secure satisfaction. We respectfully call upon your office to look into this situation in order to determine if the objectives of the Clinton administration are in fact being served by the current policy of the National Weather Service. Someone with judgment and discretion needs to examine the "Catch 22" kind of responses that seem to be the only ones we can get from the National Weather Service and make the determination that the stakes are too high in Northern California, in terms of the exposure of life and property to leave a 17,400 square mile area uncovered by radar and unserved by a weather office with its valuable local weather information.

Although there have been some assertions that there may be some type of weather service maintained in this region for fire and agricultural purposes and there have been assertions that the military radar at Oroville may provide some civilian weather information, no one seems to have the authority to make a flat-out guarantee of such assertions. Specifically, Mr. Secretary, we respectfully request that your office give us the assurances that we need relative to maintenance of the local weather station and the availability of NEXRAD radar capacity covering the 17,400 square miles of Northern California that is presently destined to be unprotected, including the upper reaches of the Sacramento River canyon so that life, property and the regional economy may be protected. We stand ready to provide you with whatever additional information may be required, and we are also prepared to send a delegation to meet with you to discuss the matter in greater detail.

Very truly yours,

Robert C. Anderson
Mayor

misc494.mmc/ga

List of NEXRAD Task Force Members

NEXRAD TASK FORCE Member Mailing List
April 1994

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Bob Forrest, CHP-Northern Division, CHP, 2485 Sonoma Street, Redding 01
Del Schulte, CHP Air Operations, 2651 Gold Street, Redding 01
Eugene Poch, Director-District 2, Caltrans, PO Box 494040, Redding 96049
Gary Otremba, Chief/Maintenance Engineering, Caltrans, PO Box 494040, Redding 96049
John McCamman, CAO, County of Shasta, 1815 Yuba Street, Redding 96001
Keith Webster, City of Anderson, 1887 Howard Street, Anderson 96007
Bill Murphy, City Manager, City of Anderson, 1887 Howard Street, Anderson 96007
Ron Young, City Manager, City of Shasta Lake, PO Box 777, Shasta Lake 96019
George Govier, CEO, Mercy Medical Center, PO Box 496009, Redding 96049
Steve Corbeil, CEO, Redding Medical Center, PO Box 496072, Redding 96049
Ryan Sale, Council Member, City of Red Bluff, PO Box 400, Red Bluff 96080
Scott Warner, Forester, Sierra Pacific Industries, PO Box 496014, Redding 96049
Gene Starks, Deputy Chief-Fire Control, CDF, 6105 Airport Road, Redding 96002
Duane Fry, Deputy Chief-Operations, CDF, 6105 Airport Road, Redding 96002
Shannon Phillips, Field Representative for Congressman Wally Herger, 410 Hemsted Drive, Suite 115, Redding 96002
Mark DeSio, Field Representative for Congressman Vic Fazio, 332 Pine Street, Red Bluff 96080
Francie Sullivan, Chair, Shasta County Board of Supervisors, 1815 Yuba Street, Redding 96001
Scott Carter, Former Mayor, PO Box 496006, Redding 96049
Robert Anderson, City of Redding
David Kehoe, Council Member, City of Redding
David McGeorge, Council Member, City of Redding
Ken Murray, Council Member, City of Redding
Pat Anderson, Council Member, City of Redding
Larry Preston, Engineer/Manager, ACID, 2810 Silver Street, Anderson 96007
Ned Coe, President, Shasta County Farm Bureau, Glenburn Star Rt., Fall River 96028
Pam Giacomini, Regional Field Representative, California Farm Bureau, 41363 Opdyke Lane, Hat Creek 96040
Dan Markham, Shasta-Lassen Cooperative Ext., PO Box 9, McArthur 96056-0009
Larry Forero, Shasta Co. Farm Advisor, 1851 Hartnell Avenue, Redding 96002-2217
Brad McDannold, Shasta County Cattlemans Assn., PO Box 492401, Redding 96049
Dale Albaugh, Fall River/Big Valley Cattlemans Assn., PO Box 66, McArthur 96056
Ellington Peek, President, Shasta Livestock Auction Yard, Inc., PO Box 558, Cottonwood CA 96022
Dan Fisher, Fruit Growers Supply Co., 37530 Hwy 299E, Burney CA 96013
Barry Taylor, Timber Buyer, Roseburg Lumber, PO Box 697, Anderson 96007
Don Beatty, General Manager, Beatty & Assoc., PO Box 990898, Redding 96099
Dennis Fischer, City Manager, City of Red Bluff, PO Box 400, Red Bluff 96080
Bob Christofferson, City Manager, City of Redding
Gayle Anstine, City of Redding Staff

NEXRAD Mailing List
Page 2

Potential Consultants/Information Sources
Ralph Brown, PO Box 1284, Weaverville 96093
Chris Fontana, National Weather Service, 6101 Airport Road, Redding 96002
Bill Henning, 2799 Summerbreeze, Redding 96001
Ann Kemkamp, CH2M Hill, PO Box 492478, Redding 96049

Legislators
Wally Herger, Congressman, 2433 Rayburn HOB, Washington DC 20515-0502
Vic Fazio, Congressman, 2113 Rayburn HOB, Washington DC 20515-0502
Barbara Boxer, Senator, 112 Hart Building, Washington DC 20510
Dianne Feinstein, Senator, 331 Hart Building, Washington DC 20510

Staff
George Perry, Airports Director, City of Redding

Other Interested Parties
Paul Capener, Project Superintendent, Bureau of Reclamation, 16349 Shasta Dam Boulevard, Shasta Lake 96019-8400
Robert Holquist, Reporter, Record Searchlight, PO Box 492397, Redding 96049
Polly Bell, Reporter, KRCR-Channel 7, PO Box 7R, Redding 96099-2217
Mike Murphy, Reporter, Channel 24, 448 Redcliff Drive, Suite 202, Redding 96002
Laurie Elrod, Reporter, Channel 12, PO Box 492588, Redding 96049-2588
Dave Mair, Superior Balloons, PO Box 191, Shasta 96087
Bonnie Kimbley, Retired Public Employees' Assn., 1007 3rd Street, Redding 96002
Don Lapp, Retired Public Employees' Assn., 310 Travertine Court, Redding 96003
Helen Couser, PO Box 22, Whitmore CA 96096
E. Del Smith & Co., 1130 Connecticut Avenue, NW, Suite 650, Washington DC 20036
News Media

Other Affected Cities

City of Yreka, James Dillon, City Manager, 701 Fourth Street, Yreka 96097
City of Weed, Debby Salvestrin, City Clerk, PO Box 470, Weed 96094
City of Dunsmuir, Alan Harvey, City Manager, 5915 Dunsmuir Ave., Dunsmuir 96025
City of Corning, Steven Kimbrough, City Manager, 794 Third Street, Corning 96021
City of Orland, Al Calonico, City Manager, 815 Fourth Street, Orland CA 95963

c:misc472.mc/ga

Representative Letters regarding Importance of Adequate Weather Information to North Sacramento Valley California

20-946 30(

Representative Letters Regarding Importance of Adequate Weather Information to North Sacramento Valley California

Following are representative letters from a diversity of federal, state and community organizations - ranging from hospitals that operate emergency ambulances to the people who keep interstate commerce moving -- expressing concern that localized weather forecasting services will be eliminated if a NEXRAD radar is not located appropriately to serve this region.

Congress of the United States, Washington, D.C. 20515, signed by U.S. Senator Dianne Feinstein, U.S. Senator Barbara Boxer, Member of Congress Vic Fazio, Member of Congress Wally Herger, U.S. Representative Dana Rohrabacher, U.S. Representative Bill Baker, U.S. Representative Ralph M. Hall, U.S. Representative Ed Royce, and U.S. Representative Jim Sensenbrenner

Congress of the United States, Washington, D.C. 20515, signed by U.S. Senator Dianne Feinstein, U.S. Senator Barbara Boxer, Member of Congress Wally Herger, and Member of Congress Vic Fazio

Congressman Vic Fazio, Washington D.C., to Secretary of Defense Les Aspin

Congressman Vic Fazio, Washington D.C., to Department of Commerce Secretary Ron Brown

Congressman Wally Herger, Washington, D.C.

United States Senator Dianne Feinstein, Washington, D.C.

Governor Pete Wilson, State Capitol, Sacramento, California

U.S. Department of Agriculture, Shasta-Trinity National Forests, Steve Fitch, Forest Supervisor, Redding, California

U.S. Department of the Interior, Bureau of Reclamation, J. Paul Capener, Area Manager, Shasta Lake, California

Mercy Medical Center of Redding, George Govier, President & CEO, Redding, California

Mercy Medical Center of Mt. Shasta, James R. Hoss, President, Mt. Shasta, California

Redding Medical Center, Stephen E. Corbeil, CEO, Redding, California

St. Elizabeth Community Hospital, Penny Sack, RN, MHL, Director of Emergency, Red Bluff, California

Trinity Hospital, Patricia Menning, Administrator, Weaverville, California

Jon H. Bayers, M.D., Eye Physician and Surgeon, Redding, California

State of California Board of Forestry, Robert Kerstiens, Sacramento, California

State of California, California Highway Patrol, J.M. Barnett, Chief, Northern Division, Redding, California

State of California. Department of Transportation, Gary Otremba, P.E., Chief, Maintenance and Engineering Division, Redding, California

Greater Redding Chamber of Commerce, Frank Strazzarino, Jr., Executive Director, Redding, California

Sierra Pacific Industries, Scott Warner, Forester, Timber Division, Redding, California

Shasta County Board of Supervisors, Trish Clarke, Chair, Redding, California

Shasta County Sheriff's Office, Jim Pope, Sheriff, Redding, California

Shasta County Department of Public Works, R.W. Curry, Director, Redding, California

Shasta County Department of Resource Management, R. Michael Kussow, Air Pollution Control Officer, Redding, California

Burney Chamber of Commerce, Stephen Clapper, President, Burney, California

City of Anderson, Bill Murphy, City Manager, Anderson, California

City of Red Bluff, Dennis W. Fischer, City Manager, Red Bluff, California

City of Redding, George Perry, Airports Director, Redding, California

City of Mt. Shasta, Russ Porterfield, Mayor, Mt. Shasta, California

City of Shasta Lake, Ronald Young, City Manager, Shasta Lake, California

CH2M Hill, Anne L. Kernkamp, Vice President, Redding Office, Redding, California

Shasta County Cattlemen's Association, Bradd McDannold, President, Redding, California

Shasta Livestock Auction Yard, Inc., Ellington Peek, President, Cottonwood, California

Intermountain Development Corporation, Milton Schultz, President, Burney, California

Helen L. Couser, P.O. Box 22, Whitmore, California

Robert and Treva Rice, Citizens, 2262 Cilantro Drive, Redding, California

David E. Klasson, Citizen, 14397 Fern Road, Whitmore, California

Patricia Pitt, Citizen, 2710 Oxford Road, Redding, California

Polly H. Roach, Citizen, 1422 Willis Street, Redding, California

Congreſs of the United States
Washington, DC 20515

July 20, 1994

The Honorable Ron Brown
Department of Commerce
14th and Constitution, N.W.
Washington, D.C. 20230

Subject: Insufficient coverage of California north counties under National Weather Service Next Generation Radar Equipment weather surveillance modernization program.

Dear Mr. Secretary:

We wish to ask your attention to the need to mitigate an administrative oversight concerning the proposed NEXRAD siting in the north counties of California under National Weather Service modernization program current planning.

The recent deaths of fourteen forest fire fighters in Colorado due to what appears to be unreported wind gusts highlights the urgency of this letter to you. The same weather irregularities are unusually common in the north valley areas of California which along with other vital factors, might not have been fully considered in the Department's NEXRAD siting determinations.

Specifically, technical assessments have shown that the Redding/Red Bluff areas in Shasta and Tehama Counties especially will not be sufficiently covered by any of the planned NEXRAD radar units assigned to that region because, more than any other area in California, radar signals will be blocked by mountains.

As a result, economic and public safety vital functions will be disenfranchised including aero-medical, forest fire protection, interstate transportation, Superfund threat management, and state water supply.

Members of the House Science, Space, and Technology Committee want to assure that NOAA follow the "no degradation" directive of the Committee in administrating the NEXRAD program.

While the several local governmental jurisdictions that will be adversely impacted have approached the Presidential staff, we would also like to ask your attention to this matter because of the clear intent of Congress involved here.

Sincerely,

Dianne Feinstein
DIANNE FEINSTEIN
U.S. Senator

Barbara Boxer
BARBARA BOXER
U.S. Senator

Vic Fazio
VIC FAZIO
Member of Congress

Wally Herger
WALLY HERGER
Member of Congress

Dan Rohrabacher

Bill Baker

Ed Royce

Ralph M. Hall

Congreſs of the United States
Washington, DC 20515

October 6, 1993

The Honorable Ronald Brown
Secretary of Commerce
U.S. Department of Commerce
Washington, D.C. 20230

Dear Secretary Brown:

We would like to solicit your support in assisting our constituents in the Redding/Red Bluff area in their desire to have Next Generation Weather Radars (NEXRAD) equipment located in their community.

It is our concern that the National Oceanic and Atmospheric Administration's (NOAA) plan for Modernization and Associated Restructuring of the National Weather Service will have a detrimental impact on weather services in our area. It is our understanding that the current modernization plan would severely limit the role of the Redding Weather Station beginning as early as 1996. According to the plan, the Redding/Red Bluff area would gather its weather observation information from NEXRAD equipment in five areas encompassing three states.

We have deep concerns about the ability of these five stations located in Medford, Oregon; Reno, Nevada; Eureka, California; Beale Air Force Base, California and Sacramento, California to fully service the Redding/Red Bluff region's unique and often severe weather patterns. For example, not only are the coastal patterns in Eureka far different from those in Redding, but it is our understanding that the NEXRADs are required to be spaced for a range of no more than 150 miles to assure accurate coverage. Since Eureka is 160 miles from Redding, with 7,500 to 9,050 foot peaks of the Klamath Mountains lying between the two cities, we question whether radar located at this great distance over such rough terrain can accurately detect the severe weather patterns that our area experiences.

The Redding Municipal Airport where the local weather station is located is the focal point for air transportation to seven counties in northern California with a population base exceeding 450,000. It is geographically in the center of the ground transportation network of highways, railroads and at the headwaters of the Sacramento River. We are extremely concerned about the potential safety hazards should this weather facility be downsized.

Accurate and constant weather coverage of the seasonal fires and winter flood and snow conditions is vital to the survival of the agricultural and timber industries in northern California. Even with the present coverage, well over 700,000 acres of forests have been burned in recent years. The already struggling timber dependent community in this region simply cannot afford additional burned acreage due to insufficient weather observation coverage.

According to the NOAA Authorization Act of 1992 (P.L. 102-567), certification that a community dependent on a weather station scheduled for closure will not experience any degradation of services is required before any downsizing of that facility can begin. We cannot imagine any scenario in which the Department of Commerce would be able to guarantee that these five NEXRAD facilities would be able to accurately forecast weather in the Redding/Red Bluff area given this region's great distance from these facilities and its severe weather patterns. It is our hope that you would strongly support installing a NEXRAD facility in Redding, California.

Thank you for your consideration of this very important matter. We look forward to hearing your views on Redding's need for a NEXRAD facility, and would like to discuss this with you personally at your earliest opportunity.

Sincerely,

Dianne Feinstein
DIANNE FEINSTEIN
U.S. Senator

Barbara Boxer
BARBARA BOXER
U.S. Senator

Wally Herger
WALLY HERGER
Member of Congress

Vic Fazio
VIC FAZIO
Member of Congress

10/18/93 Copies to: Robert Holquist, Record Searchlight
Chris Fontana, National Weather Service
Rod Dinger, Interim Airports Director

VIC FAZIO
3rd District, California
Vice Chair–Democratic Caucus
Committees:
Appropriations
Select Committee on Hunger
Democratic Steering and Policy

NEXRAD
FILE

Please Respond To:
2113 Rayburn House
Office Building
☐ Washington, DC 20515-0503
(202) 225-5716

722B Main Street
☐ Woodland, CA 95695
(916) 666-5521

Congreſs of the United States
House of Representatives
Washington, DC 20515-0503

A090-100-935

June 8, 1993

Honorable Les Aspin
Secretary of Defense
Washington, D.C., 20301

Dear ~~Mr. Secretary~~ Les:

I am requesting your immediate assistance in obtaining a surplus Next Generation Radar (NEXRAD) for placement at a federally owned radar site west of Red Bluff in my district. Military base closures have made surplus units available.

The National Weather Service plans to close its weather station in the neighboring community of Redding, represented by Congressman Wally Herger, and install NEXRAD units in Sacramento, Eureka, Medford, Ore., and Reno. Weather stations that do not have a NEXRAD to monitor, such as Redding, are to be closed.

The problem with the National Weather Service plan is that the new NEXRAD units won't provide adequate coverage of the Northern Sacramento Valley because of mountains and canyons. However, a NEXRAD west of Red Bluff could cover the Sacramento River Canyon and be used in predicting weather for motorists traveling north on Interstate 5 to Shasta Lake, which is used for recreational and agricultural purposes. It would spot wind patterns, such as inversion layers, tornados and wind shear that are of major importance to my district's predominantly agricultural communities. Aviation would also be better served.

Again, I urge your immediate assistance in obtaining a surplus NEXRAD for installation in my district. It would allow the weather station in Redding to remain open for monitoring purposes, which Rep. Herger strongly supports. Should you have any questions, please call me at (202) 225-5716.

Sincerely,

Vic

VIC FAZIO
Member of Congress

VF:md

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

[redacted]

[redacted]

VIC FAZIO
3rd District, California
Vice Chair, Democratic Caucus
Committees:
Appropriations
Select Committee on Hunger
Democratic Steering and Policy

Congress of the United States
House of Representatives
Washington, DC 20515–0503

Please Respond To:
☐ 2113 Rayburn House
Office Building
Washington, DC 20515-0503
(202) 225-5716
☐ 722B Main Street
Woodland, CA 95695
(916) 666-[illegible]

June 2, 1993

Ron Brown, Secretary
Department of Commerce
14th Street & Constitution Avenue, NW
Washington, D.C. 20230

Dear Ron:

I am requesting your assistance with a problem facing the Northern Sacramento Valley. The matter directly involves my district and that of Rep. Wally Herger.

The scenario is that the National Weather Service plans to close its weather station in Redding. If that happens, the experts who operate the station and the countless people who rely on it assure me that service will not be adequate. The National Weather Service plan calls for the installation of Next Generation Radar (NEXRAD) in Sacramento, Eureka, Medford, Ore., and Reno. Weather stations that do not have a NEXRAD to monitor, such as Redding, are to be closed.

I urge your office to work with the Department of Defense to obtain a surplus unit for installation in my Congressional District, which has a location ideal for a NEXRAD. I'm confident that recent military base closures have made a surplus unit available.

A NEXRAD should be placed in my district because the units planned for Sacramento, Eureka, Medford, Ore., and Reno won't give adequate coverage of the Northern Sacramento Valley because of mountains and canyons.

Also, a NEXRAD in my district would be able to look up the Sacramento River Canyon and predict weather for motorists traveling north on Interstate 5 to Shasta Lake, which is used for recreational and agricultural purposes. It could spot wind patterns, such as inversion layers, tornados and wind shear that are of major importance to my district's predominantly agricultural communities. Aviation would also be better served.

The federal government owns a radar site west of Red Bluff in Tehama County that would be an ideal location for a NEXRAD. Placing a NEXRAD in Tehama County would keep the Redding weather station open, which Congressman Herger supports. The station would

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

[redacted] [redacted]

2)

2-2-2
Ron Brown
May 28, 1993

monitor the NEXRAD.

Again, I urge your help in obtaining a surplus NEXRAD for placement in my district. Should you have any questions, please call me at my Washington, D.C. office at (202) 225-5716. I appreciate your immediate response to my request.

Sincerely,

Vic

VIC FAZIO
Member of Congress

VF:md

P.S. this would be very helpful to us in Northern California —

[redacted] [redacted]

7/20/93 Copy to Robert Holquist
Record Searchl t

c: Council

WALLY HERGER
2d DISTRICT CALIFORNIA

PLEASE REPLY TO

☐ WASHINGTON OFFICE:
2433 RAYBURN HOUSE OFFICE BUILDING
(202) 225-3076

DISTRICT OFFICES

☐ 55 INDEPENDENCE CIRCLE, SUITE 104
CHICO, CA 95926
(916) 893-8363

☐ 410 HEMSTED DRIVE, SUITE 115
REDDING, CA 96002
(916) 223-5898

[redacted]
WAYS AND MEANS

COMMITTEE ON
THE BUDGET

Congress of the United States
House of Representatives
Washington, DC 20515-0502

A090-100-935

RECEIVED
JUL 20 1993
CITY CLERK'S OFFICE

June 21, 1993

Carl Arness
Mayor
City of Redding
760 Parkview Av
Redding, California 96001-3396

Dear Carl:

Thank you for informing me that you have contacted Senator Feinstein regarding your strong support for bringing Next Generation Radar (NEXRAD) equipment to Redding. I appreciate your strong commitment to the Redding community in its effort to ensure that it will be supplied with the most accurate weather forecasting technology available.

In recent years, I have been active in the House of Representatives in an effort to convince the National Weather Service and the Department of Commerce that Redding will not receive adequate coverage if its weather station is downgraded as scheduled in 1996. As you may know, the National Weather Service is planning on replacing the Redding Weather Station with five NEXRAD facilities located in Medford, Oregon; Sacramento, California, Beale Air Force Base, California; Reno, Nevada; and Eureka, California.

I have deep concerns about the ability of these five stations located in three states to fully service Redding's unique and often severe weather patterns. Not only are the coastal patterns in Eureka far different from those in Redding, but it is my understanding that the NEXRADs are required by law to be spaced for a range of no more than 150 miles. Since Eureka is 160 miles from Redding with 7,500 to 9,050 foot peaks of the Klamath Mountains lying between the two cities, I question whether radar located at this great distance over such rough terrain can accurately detect the severe weather patterns that Redding experiences.

During the past two months, I have contacted Secretary of Commerce Ron Brown and requested his support for bringing a NEXRAD facility to Redding. More recently, I met with Dr. Joe Friday, Director of the National Weather Service, regarding

Redding's qualifications for such equipment. Although Dr. Friday admitted that Redding was not currently on the list of cities for any surplus NEXRAD equipment, I asked him to reconsider Redding's unique weather patterns and needs for such a facility. Dr. Friday admitted during the course of our meeting that the accuracy of NEXRAD facilities at high altitudes at distances of 150 miles or more has not been proven.

Like you, I along with Representative Fazio have contacted Senator Feinstein as well as Senator Boxer regarding this issue. I will be back in touch with you on this just as soon as I have received responses from them.

Securing a NEXRAD facility for Redding continues to be a top priority of mine. I will continue to do everything I can to see that this hope becomes a reality and will keep you posted on any actions we can work on together in this important matter.

Sincerely,

Wally

WALLY HERGER
Member of Congress

WH/bb

DIANNE FEINSTEIN
CALIFORNIA

Council
City Mana

File

United States Senate
WASHINGTON DC 20510-0504

July 30, 1993

A090-100-93

The Honorable Carol Arness
Mayor
City of Redding
760 Parkview Avenue
Redding, California 96001

Dear Mayor Arness:

Thank you for contacting me with regard to the reorganization of the National Weather Service, and the possible impacts that it will have on the City of Redding.

As this reorganization of the National Weather Service proceeds, I will watch closely to ensure that the Department of Commerce maintains its commitment that a community dependent on a weather station scheduled for closure will not experience any degradation of services.

I appreciate the concerns you raise regarding the proposed weather station alignment that places the nearest NEXRAD radar in Eureka, 160 miles from Redding. A number of months ago, I flew by private plane from Eureka to Redding, making me very familiar with the terrain that lies between the two cities.

My staff has been in contact with the staff of Congressman Herger, and will work to see that the concerns of Redding are addressed. I will keep you informed as we progress. Thank you again for contacting me, and if you have any other questions or concerns, please do not hesitate to contact me, or Matthew Middlebrook of my Washington staff at (202) 224-3841.

Sincerely,

Dianne Feinstein
United States Senator

DF:msm

GOVERNOR PETE WILSON

July 28, 1994

The Honorable Ronald H. Brown
Department of Commerce
14th St. and Constitution Ave., N.W.
Washington, D.C. 20230

Dear Mr. Secretary:

I am writing regarding the costly and dangerous ramifications that current National Weather Service (NWS) reorganization plans may hold for Northern California.

I am deeply concerned that the pending closure of the NWS office in Redding will leave a large area of California without weather radar coverage. From all analyses I have seen, the NWS plan to attempt to provide forecasts from stations in Sacramento, Medford, and Reno will seriously degrade the quality of weather information available in northern-most California.

At present, the people of the northern Sacramento Valley and surrounding foothill and mountain communities are protected by real-time weather information provided by the NWS office in Redding, California. The California Highway Patrol and the California Department of Transportation (Caltrans) rely on this information daily to maximize transportation efficiency along Interstate 5, the main north-south route on the West coast, as well as other State routes, and to ensure public safety.

However, the State agencies that depend on the NWS account for only a small part of the community that is served by accurate weather information. Aero-medical transportation is one of the services most affected by weather information. A population approaching half a million people and the rugged terrain of Northern California dictate the use of air ambulances to transport those in need of trauma, cardiac, or obstetrical care. Last year alone, over 1,600 flights were made to and from area hospitals.

According to the U.S. Forest Service, the elimination of the Redding office will also have a "significant impact" on fire fighting. Near-term weather information, especially data on changing wind patterns, is critical to both fire fighting and firefighter safety, as evidenced by the recent tragedy in Colorado where 14 firefighters lost their lives due to shifting winds.

STATE CAPITOL · SACRAMENTO, CALIFORNIA 95814 · (916) 445-2841

Additionally, the flood control and water storage operations of Shasta Dam are both dependent upon real-time weather data, as is the sizeable agricultural sector of the northern Sacramento Valley. Even the containment of toxic discharges from the Iron Mountain Superfund site is affected by dams that must be controlled to accommodate the flash flooding endemic to the mountain terrain.

The vital importance of the NWS Redding office to Northern California's emergency services as well as its more broad benefits are abundantly clear. One promising option for maintaining weather service may be to station one of the federal government's many surplus NEXRAD systems in Redding. This would provide continuity of service at minimal cost to taxpayers.

Both federal law itself and common sense dictate that weather service be maintained at its current level in Northern California. I urge you to ensure that the NWS reorganization plan is corrected to address this potentially serious problem.

Sincerely,

Pete Wilson

PETE WILSON

United States Department of Agriculture
Forest Service
Shasta-Trinity National Forests
2400 Washington Ave.
Redding, CA. 96001
(916) 246-5222
TDD (916) 246-5313

Reply To: 5120-2/5100/1300/1500

Date: June 15, 1994

Shasta County Board of Supervisors
Francie Sullivan
1815 Yuba Street, Suite 1
Redding, CA 96001

Dear Francie:

This is in reply to the question as to the importance to the Forest Service of the National Weather Service facility in Redding.

The Shasta-Trinity National Forests is one of seven National Forests located in Northern California that relies heavily on the dedicated fire weather staff to provide forecasts in support of our yearly fire season and prescribed burning programs.

The proposed elimination of the National Weather Service Office located here in Redding, California, will have a significant impact to our fire program.

Just the Shasta-Trinity National Forests experiences between 250-350 wildland fires each year. Our past five-year average is 266 fires/per year. The fire weather forecasts are a vital part of our suppression/pre-suppression planning operation. It is easy to see that if you factored in the other Forests, parks and private land fires, there would be well over a thousand fires where we and partner agencies require information critical to successful suppression efforts as well as to safety of firefighters and surrounding communities.

Prescribed fires are a key tool for reducing hazardous fuels. We accomplished approximately 3,400 acres for our FY 1994 prescribed burning program. In FY 1995 we expect to increase those acres to 4,000, and by FY 1997 increase to about 10,000 acres per year. Here again, many other agencies do this same work in this part of California. Fire weather forecasts are critical in helping us find the right weather conditions to accomplish the burn projects and meet air quality/smoke management guidelines.

The workload is increasing as we move toward an Ecosystem Management/Forest Health approach.

I hope this information will be useful to you.

Sincerely,

STEVE FITCH
Forest Supervisor

CC: W. Herger, U.S. Congress

United States Department of the Interior

BUREAU OF RECLAMATION
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, California 96019-8400

IN REPLY REFER TO
NC-100
RES-7.00

JUN 29 1994

Ms. Francie Sullivan
Board of Supervisors
1815 Yuba, Suite 1
Redding, California 96001

Subject: Redding Area Weather Forecasting Services

Dear Ms. Sullivan:

The possibility of reducing weather forecasting services within the Redding-Shasta County area by closure of the Redding forecasting center has been of concern to both the City of Redding and Shasta County. Reclamation's Northern California Area Office supports you in your efforts to retain local forecasting abilities.

As you are aware, many Federal and State agencies are involved in a very intensive long-term program to restore salmon population in the Sacramento River, including the endangered winter-run salmon. Our efforts in this federally-mandated program have involved development of some very sophisticated, computerized river temperature models.

A critical element to the success of these models is accurate and timely air temperatures and storm forecasts. This data is being provided by the local Redding forecast center. If this service were to be discontinued, it would reduce the accuracy and calibration of our computer models. We use information provided by the forecast center on a daily basis in conjunction with other information which, in turn, is used to determine river flow releases and hydroelectric power generation.

We support you in your efforts to maintain this service, as it provides a very valuable service for our operations.

Sincerely,

B. Gibbons

FOR J. Paul Capener
Area Manager

cc: Mr. Bob Christofferson, City Manager
City of Redding
760 Parkview Avenue
Redding, California 96001

Mercy Medical Center Redding

April 22, 1994

Ronald Brown, Secretary of Commerce
Department of Commerce
14th St. between Constitution Ave. & E St. NW
Washington, D.C. 20230

Dear Mr. Brown:

This letter is to express the concerns of Mercy Medical Center regarding the National Weather Service decision not to install a NEXRAD radar system in the greater Redding area. Mercy Medical Center operates an air ambulance service that started in 1971. We have two fixed wing aircraft and an air ambulance helicopter that has been in operation since 1986. Serving areas throughout northern California, our fixed wing air ambulance service flies 550 flights annually. In addition to these fixed flights, our helicopter flies 350 flights per year to care for patients in the immediate vicinity. As a result of this sophisticated air ambulance service, Mercy is able to transport patients to the appropriate medical facility in a very short period of time. Our ability to provide a safe service has been greatly assisted by the location of the National Weather Service facilities in the Redding area. The decision of the National Weather Service to install NEXRAD capability in Sacramento rather than Redding will reduce the quality of the weather information so vital for the operation of an air ambulance service.

The immediate terrain around Shasta County and to the north, east and west of Redding, provides for challenging flying conditions. Our pilots tell me that some of the most severe flying weather in the country occurs each winter in the mountains surrounding Redding and Shasta County. In addition, the weather conditions change dramatically. As we understand the system, these changing events cannot be easily identified through NEXRAD services provided out of Sacramento. Our concern is that we will not have the same level of capability that we would have if NEXRAD were located in the Redding vicinity.

We understand that the mission of the National Weather Service is to save lives and property by watching for adverse weather systems and warning people of the approach of those systems. Certainly as an operator of an air ambulance service, that mission is important to our effectiveness as well. In order for Mercy Medical Center to respond promptly and safely to the needs of injured victims in our surrounding area, we need to know what is happening with the weather and the impact it will have on our aircraft and our patients. The system we will have once the National Weather Service installs in services in Sacramento will not be as good as it should be for our area. We are concerned that this compromised weather warning system will have an adverse effect on the effectiveness of our air ambulance service.

Clairmont Heights
P.O. Box 496009
Redding, CA 96049-6009
(916) 225-6000

A Division of Catholic Healthcare West

We strongly advise that the National Weather Service reconsider its decision and install a modern system located in the North Valley region that will be better able to predict weather systems that will affect all of us. Failure to do so will risk compromising our ability to respond to patients who need and depend on our air ambulance capabilities.

We urge the National Weather Service to locate NEXRAD services in our immediate area to maximize the safety of the patients we serve.

Sincerely,

George A. Govier
President and
Chief Executive Officer

GAG:kc

Mercy Medical Center Mt. Shasta

May 10, 1994

Ronald Brown, Secretary of Commerce
Department of Commerce
14th St. between Constitution Ave. & E St. NW
Washington, D.C. 20230

Dear Mr. Brown:

I am writing this letter to express the concerns of Mercy Medical Center Mt. Shasta regarding the possible closure of the weather station in Redding.

Mercy Medical Center Mt. Shasta is located in Siskiyou County and depends on air ambulances to transport our critically ill or injured patients. The closure and/or reduction in services of the Redding weather station will impair the well being of our patients.

On behalf of Mercy Medical Center Mt. Shasta I urge you to reconsider your decision and retain the Redding Weather Station.

Sincerely,

James R. Hoss

JAMES R. HOSS
President

JRH:sm

914 Pine Street
P.O. Box 239
Mt. Shasta, CA 96067
(916) 926-6111

A Division of Catholic Healthcare West

April 14, 1994

REDDING
MEDICAL
CENTER

Mr. Ronald H. Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street, between
Constitution Avenue & E Street, N.W.
Washington, D.C. 20230

Dear Secretary Brown:

Redding Medical Center operates a twin engine helicopter and a twin turbine Cessna Conquest to transport ill patients as part of our community's air ambulance service. We transport 600 to 700 critically ill patients annually from remote locations and small hospitals.

Currently, pilots receive real time weather for our local area through the Flight Service Station in Red Bluff from 6:00 a.m. until 10:00 p.m. daily, and from the Redding National Weather Service 24 hours a day. If the Redding weather station closes, pilots would have no way to get accurate weather conditions for this area during the hours that the Red Bluff FSS is closed. The Red Bluff FSS is scheduled for closure in 1995. This would result in our inability to ascertain any weather conditions below 10,000 feet.

If this weather station is closed, the following issues would negatively impact our ability to provide safe air ambulance service for the following reasons:

1. Redding Medical Center's helicopter service flies under Federal Aviation Regulation (FAR) Part 135 day and night. These regulations require pilots to obtain real time weather conditions and forecasts for each patient flight when flying under Instrument Flight Regulation (IFR).

   Without the Red Bluff and Redding FSS, we would be unable to transport in adverse weather conditions. Now, due to FSS assistance, we are consistently updated regarding weather conditions which enables us to select the appropriate route, resulting in a safe journey for flight crew and patients.

2. If the Redding and Red Bluff FSS are closed, the only weather conditions available for our medical flight service would be from Sacramento, Eureka, Medford, etc., which provide weather conditions above 10,000 feet and of no benefit to 95 percent of our flights.

P.O. Box 496072
1100 Butte Street
Redding, CA 96049-6072
(916) 244-5400

A National Medical Enterprises Health Care Facility

Mr. Ronald H. Brown
Secretary of Commerce
April 14, 1994
Page two

3. Without precise weather information, there will be times that the aeromedical pilot may refuse a critical patient flight because of perceived bad weather. The flight may have been scheduled had accurate weather information been available from a local weather station.

Flight safety and our ability to continue serving our community's health care needs will be seriously jeopardized without the ability for the pilots to get real time weather information for our local area.

Sincerely,

Stephen Corbeil

Stephen E. Corbeil
Chief Executive Officer

SC/deb

cc: Dr. Charles Springfield, Medical Director, Emergency Services
Ellen Read, Patient Care Administrator
Mark Eliason, Director, Emergency Services
Larry Doll, Aviation Site Manager, AirMed Team

St. Elizabeth Community Hospital

May 11, 1994

Ronald Brown, Secretary of Commerce
Department of Commerce
14th St. between Constitution Ave.
and E St. NW
Washington, D.C. 20230

Dear Mr. Brown,

I am writing on behalf of St. Elizabeth Community Hospital in Red Bluff, California. We are a small rural facility that depends on air support to transfer patients for Trauma/Cardiac/Obstetrical support through out the year.

The National Weather Service has begun a modernization program which will greatly affect the patients in Tehama County. The proposed plan calls for all "forecast" weather to be gathered and relayed to the Redding area where our air support transport teams are based. This "forecast" will come from the Sacramento area, and will not be accurate for the type of reports needed to transfer patients in a safe, effective manner.

Legislation has been passed which will close the Flight Service Station here in Red Bluff by early 1995, and the National Weather Service Station located in Redding, California in two years. The National Weather Service has elected not to install an NEXRAD radar system in the greater Redding area, and this will in turn, not provide proper care for our patients in Tehama County.

With bad weather, the medical pilots must depend on an accurate weather report, and with the current planned changes, our pilots will not have the necessary information needed to decide if a safe flight can occur.

We are asking for your help for the benefit of our patients. They deserve the same care as a patient is an urban area. It is our responsibility to provide that care, and we are asking you to help the National Weather Service to locate NEXRAD services in Redding, California which will maximize the safety of our patients and staff.

Sincerely,

Penny Sack RN, MHL

Penny Sack RN, MHL
Director of Emergency/Critical Care Services

Sisters of Mercy Serving Our Area Since 1881
2550 Sister Mary Columba Drive • Red Bluff, CA 96080-4397 • (916) 529-8000

Trinity
Hospital

P.O. Box 122
Weaverville, California 9609
(916) 623–554

May 23, 1994

Ronald Brown, Secretary of Commerce
Department of Commerce
14th St. between Constitution Ave. & E St. NW
Washington, D.C. 20230

Dear Mr. Brown:

This letter is to express the concerns of Trinity Hospital regarding the National Weather Service decision not to install a NEXRAD radar system in the greater Redding area. Redding Medical Center and Mercy Medical Center operate air ambulances serving areas throughout northern California. As a rural facility in the service area we rely on these air services to transport critically ill or injured patients to the appropriate medical facility in a very short period of time. Their ability to provide a safe service has been greatly assisted by the location of the National Weather Service facilities in the Redding area. The decision of the National Weather Service to install NEXRAD capability in Sacramento rather than Redding will reduce the quality of the weather information so vital for the operation of an air ambulance service.

The terrain between Shasta County and the Trinity County area west of Redding provides for challenging flying conditions. Some of the most severe flying weather in the country occurs each winter in the mountains surrounding Redding and Shasta County. In addition, the weather conditions change dramatically. As we understand the system, these changing events cannot be easily identified through NEXRAD services provided out of Sacramento. Our concern is that we will not have the same level of service that we would have if NEXRAD were located in the Redding vicinity.

We understand that the mission of the National Weather Service is to save lives and property by watching for adverse weather systems and warning people of the approach of those systems. In order for Redding Medical Center and Mercy Medical Center to respond promptly and safely to the needs of injured victims in our area, they need to know what is happening with the weather and the impact it will have on aircraft and patients. The system we will have once the National Weather Service installs services in Sacramento will not be as good as it should be for our area. We are concerned that this compromised weather warning system will have an adverse effect on the effectiveness of our air ambulance service.

A County Health Care Facility

We strongly advise that the national Weather Service reconsider its decision and install a modern system located in the North Valley region that will be better able to predict weather systems that will affect all of us. Failure to do so will risk compromising our ability to respond to patients who need and depend on air ambulance capabilities.

We urge the National Weather Service to locate NEXRAD services in our immediate area to maximize the safety of the patients we serve.

Sincerely,

Patricia Menning
Administrator

ev

JON H. BAYERS, M.D.
A Professional Corporation
EYE PHYSICIAN AND SURGEON

MAIN OFFICE
1441 Liberty Street, Suite 205
Redding, California 96001
(916) 241 6550

ASSOCIATE OFFICES
110 Chestnut Street
Mt. Shasta, California 96067
(916) 926-5159
1727 Main Street
Burney, California 96013
(916) 335-2233

May 10, 1994

The Honorable Ron Brown
Secretary of Commerce
Department of Commerce
14th Street Between Constitution
Avenue and "E" Street, NW
Washington, D.C. 20230

Dear Secretary Brown:

I am concerned by a proposed legislation to remove the National Weather Service from Redding, California.

I think this is an unwise decision for many reasons. It leaves a very large area in Northern California without the advisory of the weather service which is a detriment to civilian navigation as well as the local economic interest and the flight services of local healthcare providers. I think this would be a serious misgiving and leaves a large gap in the service areas provided by NEXRAD. The area is remote and lightly populated and a lot depends upon air service for many functions. The agriculture community will also be ill-served by its leaving.

I would strongly hope that you will reconsider any decisions to close this facility.

Sincerely,

Jon H. Bayers, M.D.
JHB:djf

cc: Bob Christofferson
City Manager
City of Redding
760 Parkview Avenue
Redding, CA 96001

DEC 06 '94 05:09PM SHASTA CO BOS/CAO P.2/4

STATE OF CALIFORNIA PETE WILSON, Governor

BOARD OF FORESTRY
1416 NINTH STREET
P.O. BOX 944246
SACRAMENTO, CA 94244-2460
(916) 653-8007
FAX (916) 653-0989

June 21, 1994

Dr. Elbert W. Friday, Jr.
Director
National Weather Service
1325 E. West Hwy
Silver Springs, MD 20910-3233

Dear Dr. Friday:

The California Department of Forestry and Fire Protection has informed us that they have received assurances from a representative of your office that the National Weather Service (NWS) will maintain facilities in Riverside, Sacramento, and Redding, California, which provide fire weather forecasts critical to our wildfire response. This is good news to us, as we were very concerned that the plan of the National Oceanic and Atmospheric Administration to modernize and restructure the NWS could have reduced the capacity at Redding to provide timely forecasts critical to fire fighting efforts in Northwestern California.

We applaud your decision and welcome the close continued partnership between our two agencies.

Sincerely,

Robert J. Kerstiens

Robert J. Kerstiens

cc: Senator Dianne Feinstein
Senator Barbara Boxer
Congressman Wally Herger
Secretary of Commerce Ronald Brown

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State of California—Business, Transportation and Housing Agency PETE WILSON, Governor

DEPARTMENT OF CALIFORNIA HIGHWAY PATROL

2485 Sonoma Street
Redding, CA 96001-3026
(916)225-2715
(800)835-2929 (TT/TDD)

April 12, 1994

Mr. Bob Christopherson
Manager, City of Redding
760 Parkview Avenue
Redding, CA 96001

Dear Mr. Christopherson:

It has recently come to my attention the National Weather Service (NWS) has elected to eliminate its Redding office as a part of implementing a new grid of technologically advanced radar facilities. It appears the NWS plan makes no provision for adequate coverage of this region.

Though recommended, apparent budgetary restraints have caused the deletion of an important north valley based link in the new NWS system of Next Generation Radar (NEXRAD). I am concerned this action will result in a significant degradation of service to the most populated region in northern California.

The California Highway Patrol depends on accurate and timely weather forecasting for storm and wind warnings and snow fall predictions, along with severe weather warnings and watches. This information is crucial in formulating daily equipment and deployment plans for ground and air operations which directly affect our ability to protect life and property.

NWS forecasts play an important role in three major facets in the delivery of our service to the public. First, deployment and equipping of our personnel during expected storm conditions. Secondly, operation of our air support resources, and last, support of allied agencies during search and rescue as well as disaster operations.

As a primary route of travel through northern California, the I-5 and SR-299 corridors have an established record for being among the most geographically challenging highways in the state. The regions unique geography is also known to spawn sudden and severe meteorological changes which negatively affect traffic safety. Supervisors routinely use NWS weather reports and forecasts to determine immediate equipment and personnel needs for deployment. This is especially true during storm conditions where efficient perations and motorists safety could be compromised by adverse or nexpected inclement weather.

Bob Christopherson
Page 2
April 12, 1994

The CHP Northern Division Air Operations Unit is based in Redding and employs two airplanes and one helicopter in service to the public and allied agencies. Routine operational areas include the northern most 13 counties in California and occasionally extend into neighboring states. These aircraft are used at a moments notice for search and rescue, law enforcement, advanced life support medical evacuations, dignitary transportation and many other events where accurate local area reports and forecasts are crucial to safe operations.

Two emergency incidents which recently threatened life and property are the Cantara Loop Hazardous Material Spill and the Fountain Fire. These disasters independently effected the safety of thousands of people. In both events NWS data from the local office was used by the California Highway Patrol and other northern California agencies to formulate deployment and evacuation plans which minimized the danger of all concerned.

In conclusion, the local NWS office has historically played a significant role in the cooperative effort of our agencies toward preserving the safety of life and property. It is my understanding this role could be greatly enhanced by the inclusion of a new NEXRAD radar facility in the north valley region.

Sincerely,

J. M. BARNETT, Chief
Northern Division

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY
PETE WILSON, Govern

DEPARTMENT OF TRANSPORTATION
P O. BOX 494040
REDDING, CA 96049-4040
TDD (916) 225-3464

Phone: (916) 225-3477

April 13, 1994

RECEIVED
CITY OF [illegible]
'94 APR 13 AM 11 19
CITY MANAGER

Mr. Robert M. Christofferson
City Manager
City of Redding
P. O. Box 496071
Redding, CA 96049-6071

Dear Mr. Christofferson:

As requested in the April 6 NEXRAD Task Force meeting, the following is a summary of how Caltrans District 2 uses the National Weather Service and what impact a change in level of service may have.

- Northern and Central California zone forecasts are received twice daily from the San Francisco office. This includes information for northeastern California and the Mount Shasta/Siskiyou area. The Redding office provides forecasts for the Redding/Red Bluff and the Mount Shasta/Yreka area. This information is broadcast by Dispatch each afternoon during the winter reporting season to all Caltrans field personnel.

- The forecast provided by the Redding office of the National Weather Service in "generally" more specific and accurate than the report from San Francisco. The Redding office also produces "special weather statements" whenever conditions warrant. These weather statements provide information regarding thunderstorms, winter storm warnings, funnel cloud sightings, etc. Details such as anticipated precipitation, snow levels, snowfall amounts, and duration are included. When received in Dispatch, they are broadcast to Caltrans field personnel.

- Whenever Caltrans is staffed over the weekend during a heavy storm, the Redding office of the National Weather Service is available to obtain specific weather information by telephone or FAX.

- Recent installation of "changeable message signs" along I-5 has required the District 2 Traffic Branch personnel to call the Redding office to obtain information about wind direction and velocity in the Mount Shasta/Yreka area. This information is used to help determine what message to display and how long to keep it active.

The information provided by the National Weather Service is one of several tools Caltrans uses to manage resources. It is especially useful during winter operations when storms can be severe enough to close Interstate 5, Route 70, and other mountain routes.

If the current level of service provided by the National Weather Service is not maintained, Caltrans District 2 will lose a valuable management tool for winter operations. Good management of limited resources requires accurate foreknowledge.

Sincerely,

Gary Otremba

GARY OTREMBA, P.E.
Chief, Maintenance Engineering
District 2

Greater REDDING Chamber of Commerce

747 Auditorium Drive • Redding, California 96001 • (916) 225-4433 • Fax (916) 225-4396

May 17, 1994

The Honorable Ronald H. Brown
Secretary of Commerce
Department of Commerce
Washington, D.C. 20230

Dear Secretary Brown:

On behalf of the Board of Directors of the Greater Redding Chamber of Commerce, I am writing to express our opposition to the closure of the National Weather Service Station in Redding.

It is the Board's belief that this closure will make it more difficult to predict weather locally and that this decision constitutes a safety hazard, which would be a severe detriment to the community at large.

Numerous businesses have expressed their concern to the Chamber that the closure would have a negative effect on future business development in the Greater Redding area.

We strongly encourage you to explore all possible alternatives to ensure that Redding does not lose its weather station.

The Greater Redding Chamber of Commerce is a 1200-member business advocacy organization whose mission is to improve the business climate and contribute to the economic health of its membership and the Greater Redding area.

Sincerely,

Frank J. Strazzarino, Jr.
Executive Director

Sierra Pacific Industries
Timber Division • P.O. Box 496014 • Redding, California 96049-6014 • (916) 365-3721

April 13, 1994

Robert Christofferson
City Manager, City of Redding
P.O. Box 496071
Redding, California 96049-6071

Sierra Pacific Industries is a family owned, integrated forest products firm with headquarters in the Redding area. With 1,100,000 acres of Northern California timberland, our Company is concerned with the National Weather Service proposal to downsize services in Northern California. We depend upon the excellent fire weather forecasting provided by the Redding Weather Service office, for fire prevention efforts in times of high fire danger, for prescribed or controlled burning programs on our Company timberlands, and for site specific forecasts on ongoing forest fires.

We have been afforded this excellent service since 1979 and have come to depend upon it. For example, Fall 1993 forecasts pinpointed a two week windy period during prescribed burning season, and foresters were able to prevent escapes and postpone further ignition during this dangerous period, based on site specific spot forecasts of the experienced and knowledgeable local forecasters. As another example, there is no doubt the quick, accurate weather forecasts made by the Redding office during the infamous Fountain Fire (August 1992, Eastern Shasta County), prevented loss of life to area residents and fire fighters. The forecasters warned and prepared those of us on the fire line for unbelievably extreme fire weather and behavior. We were able to aggressively fight the fire with extra precautions, because we kneww and trusted the local forecasters.

Sierra Pacific Industries believes it is imperative to maintain high quality fire weather forecasting in Northern California as a major part of the stewardship of private and public timberlands.

Sincerely,

Scott M Warner

Scott Warner
Forester

SW:lh

APR 13 '94 08:56AM SHASTA CO BOS/CAO P.2/3

SHASTA COUNTY

BOARD OF SUPERVISORS

Patricia A. Clarke, District 5

1815 Yuba Street, Suite 1
Redding, CA 96001
(916)225-5557
(800)479-800
(916)225-5189-FAX

December 28, 1993

The Honorable Ronald Brown
Secretary of Commerce
U. S. Department of Commerce
Washington, D.C. 20230

Subject: Potential Closure: Redding/Red Bluff Area Weather Station

Dear Secretary Brown:

It is our understanding that the National Oceanic and Atmospheric Administration's (NOAA) pl for modernization and associated restructuring of the National Weather Service will have detrimental impact on the weather service in our area. We understand that the current plan w limit the Redding weather station as early as 1996 and potentially close the office altogether i Shasta County prior to the end of this century.

Shasta County is a focal point for air transportation to the northern California area, with population base well over a half million. Also, Shasta County is geographically in the center of th ground transportation network of highways, railroads, and the headwaters of the Sacramento Rive Potential safety hazards resulting from not having accurate nearby weather projects are seriou concerns to our Board of Supervisors and our citizens.

Accurate and constant weather coverage during the annual fire season is essential to the fi response station located in Shasta County. This fire response effort is necessary for successf efforts of the National Forest Service and the California Department of Forestry and Fire Protectio Further, the Redding metropolitan basin is surrounded by mountains which create unusual localize weather patterns, which will not be discernable from the proposed stations in other parts of th and neighboring states.

Public Law 100-685 indicates that no weather office should be closed until your office has certifie that there will be no degradation of service. We are informed that there will be a significa degradation if the local National Weather Service office is closed, and local forcasting provided fro areas surrounding Shasta County. Please keep us informed of your intentions in this area and w will look forward to a successful resolution of our concerns.

Sincerely,

Patricia A. "Trish" Clarke
Chairman, Shasta County Board of Supervisors

c:
U. S. Senator Dianne Feinstein
U. S. Senator Barbara Boxer
U. S. Rep. Wally Herger
U. S. Rep. Vic Fazio
Bob Christofferson, City Manager, Redding
Chris Fontana, N.W.S. Meteorologist

PAC/ev

RECEIVED
CITY [illegible]
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CITY MANAGER

SHASTA COUNTY

Office of the Sheriff

Jim Pope
SHERIFF-CORONER

Larry Schaller
UNDERSHERIFF

May 27, 1994

The Honorable Ron Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street between Constitution
Avenue and "E" Street, NW
Washington, D. C. 20230

Dear Secretary Brown:

I am writing to urge your intervention in the pending National Weather Service plan which apparently excludes 17,400 square miles in the northern California area from NEXRAD coverage and further threatens the closure of the local station of the National Weather Service within a few years. Such action will affect the general economy of northern California which is already suffering serious problems from timber cutbacks and a series of local disasters and would leave two major hospitals which provide over 1500 air-ambulance missions a year without vital local weather information The absence of this' function in such a large area of northern California is a without a doubt a significant public safety issue.

Anything you can do to intervene in this situation will be appreciated.

Sincerely,

Jim Pope
Sheriff-Coroner
Shasta County

JJP:fmd

1525 Court Street, - Redding, California 96001 - (916) 245-6025 - FAX 245-6054

COUNTY
OF
SHASTA

INTERDEPARTMENTAL MEMORANDUM

DEPARTMENT OF PUBLIC WORKS

DATE June 27, 1994

TO Francie Sullivan, Supervisor - District 3

FROM *R.W. CURRY* BY Edward W. Seigmund
Deputy Director - Operations

SUBJECT Weather Forecasting/Snow Plowing & Road Sanding

I wanted to be sure that you and the other Board members realize how much the Shasta County Road Department depends on the local weather station for scheduling our road crews during the winter months.

The local weather forecasts have been so accurate in their predictions over the past years that we call them every day in the winter months for the next day's forecast for scheduling our crews.

Clearing snow and ice from our roadways and maintaining safe travel conditions costs us upward of $200,000 per year. This number could be much higher if we lost our real-time information on local weather and we had to rely on intuition and guesswork. Not knowing the exact path or intensity of the storm, we would sometimes call out crews unnecessarily, or worse, call them out too late -- after traffic is already snarled and the snow and ice has already been hard packed to the pavement. The same dilemma holds true for sand spreading by having some idea of what can be expected in the weather we can adjust our sand spreading operation accordingly.

To help us make the correct decisions about the size and timing of crews for snow removal we need timely, reliable information about current and forecast conditions for our specific areas. By linking detailed weather forecasts with road conditions, it helps us to decide where and when to send the plows and when to treat the road surfaces with sand.

Because of the down-sizing we do not have sufficient men and equipment to keep the roads open if a major storm moves in for any length of time, therefore, when a major storm is predicted, it gives us time to contact local contractors for hiring additional equipment and men. On the other hand, if the weather forecast predicts the storm won't be in until the following day, we don't have to keep the crews on standby that night.

I'll be the first to admit that weather forecasting is not an exact science, but our local weather forecaster is far superior to the type of weather information you receive from national weather service, and I can assure you that our snow plowing operation cost will increase if we lose the ability to receive local weather information.

Be assured that if there is anything I can do to retain our local weather forecasts, you can count on me for help.

EWS/lr

SHASTA COUNTY

DEPARTMENT OF RESOURCE MANAGEMENT

Russ Mull, R.E.H.S
Director

☐ ENVIRONMENTAL HEALTH DIVISION
James Smith, R.E.H.S.
Division Manager
1640 West Street
Redding, CA 96001
(916) 225-5787
FAX (916) 225-5807

☐ PLANNING DIVISION
James Cook
Division Manager
1855 Placer Street
Redding, CA 96001
(916) 225-5532
FAX (916) 245-6468

☐ BUILDING DIVISION
Ralph S. Overbay
Division Manager
1855 Placer Street
Redding, CA 96001
(916) 225-5761
FAX (916) 245-6468

☒ AIR QUALITY MGMT DIST
R. Michael Kussow, P.E.
Air Pollution Control Officer
1820 Butte Street
Redding, CA 96001
(916) 225-5674
FAX (916) 225-5237

☐ ADMINISTRATION
1640 West Street
Redding, CA 96001
(916) 225-5787
FAX (916) 225-56

CITY MANAGER
'94 APR 12 AM 9 08

April 11, 1994

Robert Christofferson, City Manager
City of Redding
P. O. Box 496071
Redding, CA 96049-6071

RE: National Weather Service Office - Potential Closing

Dear Mr. Christofferson:

It is my understanding that you are spearheading an effort by various north state agencies to encourage the National Weather Service to keep the weather office at the Redding Municipal Airport open and capable of serving our area.

The Shasta County Air Quality Management District relies on accurate meteorologic data provided by this office to accomplish the following duties related to ambient air quality and public health concerns:

1) Burn day determinations and appropriate restrictions depending on elevation within the County.

2) Prediction of ozone exceedance days which are significantly dependent upon summer weather conditions. Starting in June of this year we will be issuing advisories through the media and accessing Caltrans vehicle count data in an effort to reduce vehicle trips on poor air quality days.

3) Prediction of inhalable particulate matter (PM-10) exceedance days which are significantly dependent on inversion conditions during winter months. Starting in November of this year our office will be implementing a woodstove use curtailment program based on predicted weather conditions.

4) Investigation of complaints regarding fallout of fugitive emissions from upwind sources of pollutants.

We believe that a reliable and complete weather station in the Redding area is essential to fulfilling the above responsibilities.

We also are concerned that a loss of local weather forecasting will compromise our efforts to avoid reclassification as a Federal non-attainment area for ozone.

Please advise me of any supportive actions you may feel are appropriate from our agency in assisting your efforts in maintaining this valuable service in the Redding area.

Sincerely,

R. Michael Kussow, P.E.
Air Pollution Control Officer

RMK:pat

c: NWS - Chris Fontana
6101 Airport Road
Redding, CA 96002-9423

weather.ltr

BURNEY
CHAMBER OF COMMERCE
P.O. Box 36 . Burney, CA 96013
916 335-2111

May 16, 1994

On behalf of the Burney Chamber of Commerce, I would like to take this opportunity to state our opposition to the proposed closing of the National Weather Station located in Redding California. We believe that due to the unique topographical, geographical and meteorological conditions of the far Northern California, and Southern Oregon area, the closing of this office would adversely impact the ability of agricultural business, forest management, fire fighting agencies, search and rescue groups as well as aviators and motorists planning tourism associated visits to Burney in particular and the region of Northern California and Southern Oregon, in general, due to inaccurate and or incomplete information regarding current weather conditions specific to our area.

Of special concern is the ability of Air Ambulance and fire fighting and search and rescue agencies to obtain accurate information vital to servicing the remote locations of our area.

Sincerely,

Stephen Clapper

Stephen Clapper
Chamber President

sb/mw

CITY OF
ANDERSON

April 8, 1994

RECEIVED
CITY OF
'94 APR 12 PM 2 49
CITY MANAGER

Bob Christofferson, City Manager
City of Redding
760 Parkview Avenue
Redding, CA 96001

Dear Bob:

The Anderson City Council at its regular meeting last Tuesday voted 4-0 to endorse the activities of the NEXRAD Task Force. The City Council is interested in participating in the Task Force because weather service in our area is important to air safety, commerce, and flood control.

Other Task Force participants, I am sure, will comment upon the need for accurate and timely information for agriculture, commerce (Interstate 5 and railroad service through the canyons and over the mountains between here and Oregon), and for air safety. However, an important aspect of accurate and timely alerts for our community and communities downstream is the need to monitor weather in the region just south of Shasta Dam. If the dam is making heavy releases during the winter, which, of course, is often the case, a heavy rainstorm south of the dam could flood downstream communities.

Clearly the high mountains and distance between our region and the proposed NEXRAD sites will diminish the accuracy and timeliness of any alerts, thereby endangering life and property.

Please let us know, Bob, what the City of Anderson can do to support the NEXRAD Task Force.

Very truly yours,

WILLIAM A. MURPHY
City Manager

WAM/pkh

2

CITY OF RED BLUFF

555 Washington Street Post Office Box 400 Red Bluff, California 96080 (916) 527-2605

May 12, 1994

The Honorable Ronald H. Brown
Secretary of Commerce
Department of Commerce
14th Street between Constitution Ave.
and "E" Street, NW
Washington, D.C. 20230

Dear Secretary Brown:

We have just been informed that the weather station in Redding, California, may be closed by the National Weather Service in the near future. In addition, I understand that the National Weather Service plans to install Next Generation Radar (NEXRAD) stations at Sacramento, Eureka, Medford and Reno.

The City of Red Bluff was promised enhanced weather service when the local weather service office was consolidated with Redding. Now, it appears that the Redding office will be closed and forecasting moved to Sacramento.

Red Bluff is located at the southerly end of the transportation corridor that links California with Oregon and Washington. Interstate 5 is a strategic route for interstate commerce and safe travel, which depends on weather warnings and alerts from the local weather station to protect lives, commerce, and property. Red Bluff is an agricultural community where weather information for farmers must be timely and accurate. In addition, Red Bluff, Anderson, and Redding are the hub for a mountainous six county region in northern California which attracts a large number of tourists. The tourists, year-round, depend upon warnings and alerts that are generated by the weather service office.

Red Bluff is outside the effective range of the NEXRAD site in Davis, therefore, that tool cannot be used to generate real time weather information.

I urge you to support the location of the NEXRAD in close proximity to Red Bluff, Redding, or Anderson where appropriate protection of Northern California will be assured.

Sincerely,

DENNIS W. FISCHER
City Manager

DWF:sme

c:\cm\c\BROWN.512

CITY OF REDDING

INTERDEPARTMENT COMMUNICATION

RECEIVED
CITY OF REDDING
'94 APR 12 AM 11 55
CITY MANAGER

DATE: April 12, 1994

TO: Bob Christofferson
City Manager

FROM: George Perry
Director of Airports

SUBJECT: **NEXRAD and Local Aviation**

My purpose herein is to convey some concerns from a local aviation standpoint if a NEXRAD unit is not installed in Redding and the local National Weather Service (NWS) office is forced to close.

First and foremost, I do not believe there is any evidence that reliable, timely forecasting of both precipitation and surface winds will be possible for the Redding Municipal Airport if there is no longer a local NWS station.

I'm sure it will be argued that the new Automated Surface Observing System (ASOS) will do much to overcome any problems associated with the absence of a NWS station. Inasmuch as the ASOS is limited to providing data about current conditions, I do not share the view that it will be a significant element of the forecasting process.

Diminished reliability of weather forecasts for the Redding Municipal Airport certainly could result in the necessity for aircraft to unexpectedly divert to other airports. Obviously, a matter of much greater concern is the fact that such diminished reliability could increase the likelihood of a weather-related aircraft accident.

GEP/vkm
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c

CITY OF MOUNT SHASTA
305 N. MT. SHASTA BLVD.
MOUNT SHASTA, CALIFORNIA 96067
(916) 926-3464

RECEIVED
CITY [illegible]
'94 JUN 17 [illegible]
CITY MANAGER

June 16, 1994

The Honorable Ronald Brown
Secretary of Commerce
U.S. Department of Commerce
Washington, D.C. 20230

RE: Potential Closure of Redding, CA Area Weather Station

Dear Honorable Brown:

We have been led to understand that the National Oceanic and Atmospheric Administration's (NOAA) plan will restructure the National Weather Service and it will have a detrimental affect or direct impact in our area. It is our understanding that the current plan would close the Redding office as early as 1996 and possibly the area office before the year 2000.

The subject office is the focal point in our Northern California area for weather information and operational information for fighting forest fires, storm emergencies, and hazardous materials spills. In the last two years we have relied on this weather service for the infamous "Cantara Spill" into the Sacramento River, the record snowfalls and subsequent FEMA emergency of 1993, and annual fire emergencies such as the "Fountain Fire".

The local void created by the current NOAA plan would appear to violate Public Law 100-685 where your office must certify that there will be "no degradation" by the office closure.

We are positive that the service provided to the Redding Airport must be maintained to support the types of emergencies described above; localized weather patterns are key to life support provided by the airport.

Our city would appreciate your office keeping us informed of your intentions that affect our area and we are looking forward to a resolution to this specific problem.

Sincerely,

Russ Porterfield
Mayor

cc: U.S. Senator Barbara Boxer
U.S. Senator Dianne Feinstein
U.S. Senator Wally Herger
Siskiyou County Board of Supervisors
Shasta County Board of Supervisors
City of Redding

YEAR-ROUND RECREATIONAL CENTER

City of Shasta Lake

1650 Stanton Drive / P.O. Box 777 / Shasta Lake, CA 96019 / (916) 275-8827 / FAX (916) 275-8820

April 19, 1994

Mr. Ronald H. Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street between Constitution Avenue and "E" Street, NW
Washington, D.C. 20230

Dear Mr. Secretary:

The City of Shasta Lake, California's newest City, comprised of approximately 11,000 residents, has recently learned that the weather station located at Redding, California, may be closed by the National Weather Service in the coming months. Further, I understand that the National Weather Service plans to install Next Generation Radar (NEXRAD) stations at Sacramento, Eureka, Medford and Reno.

I believe that the changes proposed will drastically affect the City of Shasta Lake in terms of alert time that our micro-climatic severe weather patterns require. The City of Shasta Lake is adjacent to Shasta Dam, which is the cornerstone of the Central Valley Project controlling storm run-off from the Cascade, Sierra, Trinity, and Siskiyou Mountain ranges. In addition, the City is located at the southerly end of the transportation corridor that links California with Oregon and Washington. Interstate Highway Number 5 is a strategic route for interstate commerce and safe travel, which depends on weather warnings and alerts from the local weather station to protect lives, commerce, and property.

Shasta Lake, Redding, Anderson, and Shasta County is the hub for a mountainous six county region in northern California which attracts a large number of tourists. The tourists, year-round, depend upon warnings and alerts that pertain to Shasta Lake boating, fishing, hunting, hiking, Mt. Shasta skiing, and cross-country skiing.

Consequently, I urge you support the location of the a NEXRAD in close proximity to Shasta Lake, Redding, Anderson, or Red Bluff, where appropriate protection of Northern California will be assured.

Very truly yours,

Ronald G Young

Ronald G. Young,
City Manager

CH2M HILL
Engineers
Planners
Economists
Scientists

April 22, 1994

SWA210.99.AD

Mr. Robert M. Christofferson
City Manager
City of Redding
760 Parkview Avenue
Redding, CA 96001-3396

Dear Mr. Christofferson:

Subject: NEXRAD Radar System

The proposed loss of weather forecasting capability in Redding is disturbing to CH2M HILL and its 200 employees. Because of the impact of accurate forecasting on aviation, we are particularly concerned about the safety of our employees who annually take more than 1,500 airline trips. We are also concerned about our ability to continue in the aerial photography business if the safety of our employees is affected while flying.

We are eager to continue working with you to find a satisfactory solution to this problem. We feel very strongly that public safety, fire protection, and aviation safety can best be served by locating a NEXRAD weather radar station in Redding.

Sincerely,

CH2M HILL

Anne L. Kernkamp

Anne L. Kernkamp
Vice President
Manager, Redding Office

alk/radar
cc: Stanley A. Smith, Regional Manager

CH2M HILL Redding Office 2525 Airpark Drive, Redding, California 96001 916.243.5831
P.O. Box 492478 Redding, California 96049 Fax 916.243.1654

SHASTA COUNTY CATTLEMEN'S ASSOCIATION
P.O. Box 492401
REDDING, CALIFORNIA 96049-2401

May 5, 1994

Robert Christofferson, City Manager
City of Redding
760 Parkview Avenue
Redding, CA 96001

Dear Mr. Christofferson:

We are writing to you because of your position as chairman of the task force attempting to keep the Redding Weather Station in operation.

We want you and all others to know that we strongly support the need to keep the weather station operating in Redding. Our industry depends on weather, and it can be beneficially helped, but more importantly severely damaged by unforeseen and unforecasted bad weather occurrences. We operate in all kinds of nooks and crannies of Shasta County's highly variable geography, and we have seen, along with others, the great variability in weather from one portion to the other.

From what we have heard the proposed weather forecasting system will not be able to provide accurate forecasting throughout the highly variable terrain of Shasta County in which we operate.

Therefore, we want you to know for your task force work that we strongly urge that the weather station in Redding be continued with updated equipment.

Sincerely yours,

Bradd McDannold

Bradd McDannold
President

cc: Wally Herger
Vic Fasio
Dianne Feinstein
Barbara Boxer

Shasta Livestock Auction Yard, Inc.

P O BOX 558
COTTONWOOD, CALIFORNIA 96022
TELEPHONE (916) 347-3791

April 18, 1994

Mr. Robert Christofferson
City of Redding
760 Parkview
Redding, CA 96001

Dear Mr. Christofferson:

I am writing to protest the proposed closure of the National Weather Service office at the Redding Airport.

The continued operation of this facility is of great importance to our business. We annually purchase and ship approximately 400,000 head of cattle throughout the western United States. We travel by air on an almost daily basis. Our plane is based at the Redding Airport. Accurate, timely local weather information is absolutely vital to our flight operations.

Our auction yard in Cottonwood, California annually sells about 120,000 head of cattle. This is the major livestock marketing center for the Pacific region. Many of our most active buyers travel by air via the Redding Airport. Any loss of local weather information may cause them to avoid travel to our area. This would have a serious negative impact upon the livestock market.

We also rely upon the Redding weather office for local reports that effect our cattle shipping activities. The interstate 5 corridor is a very active cattle shipping route frequently impaired by winter storms. The loss of this information would compromise our ability to safely and economically ship cattle during the winter months.

Thank you for your assistance with this matter.

Sincerely,

Ellington Peek

Ellington Peek
President

'94 APR 19 AM 9 46
CITY MANAGER

MAY 10 199
K OF THE B

INTERMOUNTAIN DEVELOPMENT CORPORATION
BOX 450, BURNEY, CA 9601

May 6, 1994

To Whom It May Concern:

The Intermountain Development Corporation wishes to express it's concern over the possible loss of a weather station located in the Redding area. People in the Intermountain area are dependent upon knowing forecasted weather conditions for their livelihoods.

Foresters, Loggers, Timberland Owners, Ranchers, Rice Growers, Farmers, Recreationists and Citizens all have an urgent need to know the latest forecast to conduct their activities in the most efficient manner. Highway road conditions affect all who live, work and play in the Intermountain Area. A reliable and dependable weather station located in Shasta County can provide the services required.

It is also important that available weather information be disseminated as quickly and widely as possible to enable people to act upon the knowledge obtained.

Sincerely,

Milton Schultz
President

cc: Shasta County Board of Supervisors
Congressman Wally Herger
Senator Maurice Johannessen
Assemblyman Stan Stathem

COMMUNICATIONS-DISTRIBUTION
All Board Members ☑
Additional Copies to:
Board Members Received ☐
Personal Copies
No Distribution Made ☐

Ms. Helen L Couser
PO Box 22
Whitmore, CA 96096-0022

Mr Ronald H. Brown
Secretary of Commerce
Fourteenth Street
Washington, D.C. 20230

May 16, 1994

Dear Secretary Brown:

The decision to remove the National Weathe
Service (NWS) from Redding California is a
unwise decision for many reasons:

#1. This leaves a very large area of
northern California, 17,400 square miles, wit
out the advisory services not Covered by NEXR
#2. a potential life threating situations that
will affect the general economy of the northe
region, already reeling from disastrous cutbac
in the lumber industry, including othe
economic downturns to smaller businesses
and hospitals.

#3. Federal and State air attack units,-
essential to fighting wildland fires, fl
out of Redding Municipal Airport, the
present location of NWS.

#4. Agriculture interests have a high degree
of Concern over the loss of local weather station.

#5. Shasta Dam was built by Federal government
assisted by Bureau of Reclamation and NWS, to
provide flood control and water supplies to
much of California.

#6. We must pursue the location of a NEXRA
unit to serve this region where it can "se
into the Sacramento Canyon area.
#7. A location on the Coast or in Nevada will
not Suffice; Radar does not go thru Mountains
#8. Interstate Commerce, a concern of your office, w
also be adversely affected by the loss of NWS at
Redding Municipal Airport.
#9. Both Interstate-5 and the Railroad servin
all from Seattle to San Diego, pass thru a
"Choke point" in Northern Sacramento Valley at
altitudes that produce snow and adverse Weat
#10. California Dept. of Transportation and Califor
Highway Patrol, Mercy Medical Center, Reddin
Medical Center without weather information
is the difference between life and death.
The 2 Combined hospitals fly 1500+ Air Ambulance
missions a year.

We respectfully ask your office to look into this
situation:
are the objectives of the Clinton Administration
being served by the National Weather Service?
Is it wise to alienate the whole of Northern Calif-
Northern California needs and must have local NWS.
Northern California, and surrounding mountain
states, need the Presidents leadership in this
matter.

Very truly yours,

Helena L. Cormier

c
p
y

April 22, 1994

Honorable Ron Brown
Secretary of Commerce
Department of Commerce
Fourteenth Street between
Constitution Ave. & E Street N.W.
Washington, DC 20230

Dear Secretary Brown:

Since you may not be as familiar with California as the beltway areas we want to reiterate the importance of the Weather Station in Redding. Not only does this pose a threat to air travel safety but also to agricultural weather forecasts and fire fighting capabilities should a decision to close this Weather Station be made. It is most important that we retain this facility.

Climatic conditions can vary greatly within a relatively few miles. There are vast differences in weather data between Sacramento, Medford, Reno, Eureka and Redding. Readings on I-5 North of Redding differ greatly from those in the aforementioned localities where mileage might indicate many similarities.

Redding loses businesses such as the recent departure of Citizens Utilities who among other reasons for leaving decry the limited airline service. Losing the Weather Station complicates and downgrades what Redding can offer to businesses and travelers. It is most important that Redding KEEP JOBS and PROVIDE INCENTIVES to keep businesses here and in the State of California.

On a more personal note our granddaughter uses the airport many times a year enroute to the State of Washington to attend the University. Our son flies from the east coast several times a year.

We understand that one of the Clinton Administration missions for the Department of Commerce is to do things that work for California to help restore the severely damaged economy.

Do keep us informed on these issues as well as others which affect California. I await your reply with interest.

Respectfully yours,

Treva S. Rice

Robert E. Rice

14397 Fern Road
Whitmore, CA 96096
May 11, 1994

The Honorable Ron H. Brown
Secretary of Commerce
14th Street
Washington, D. C. 20230

Dear Sir:

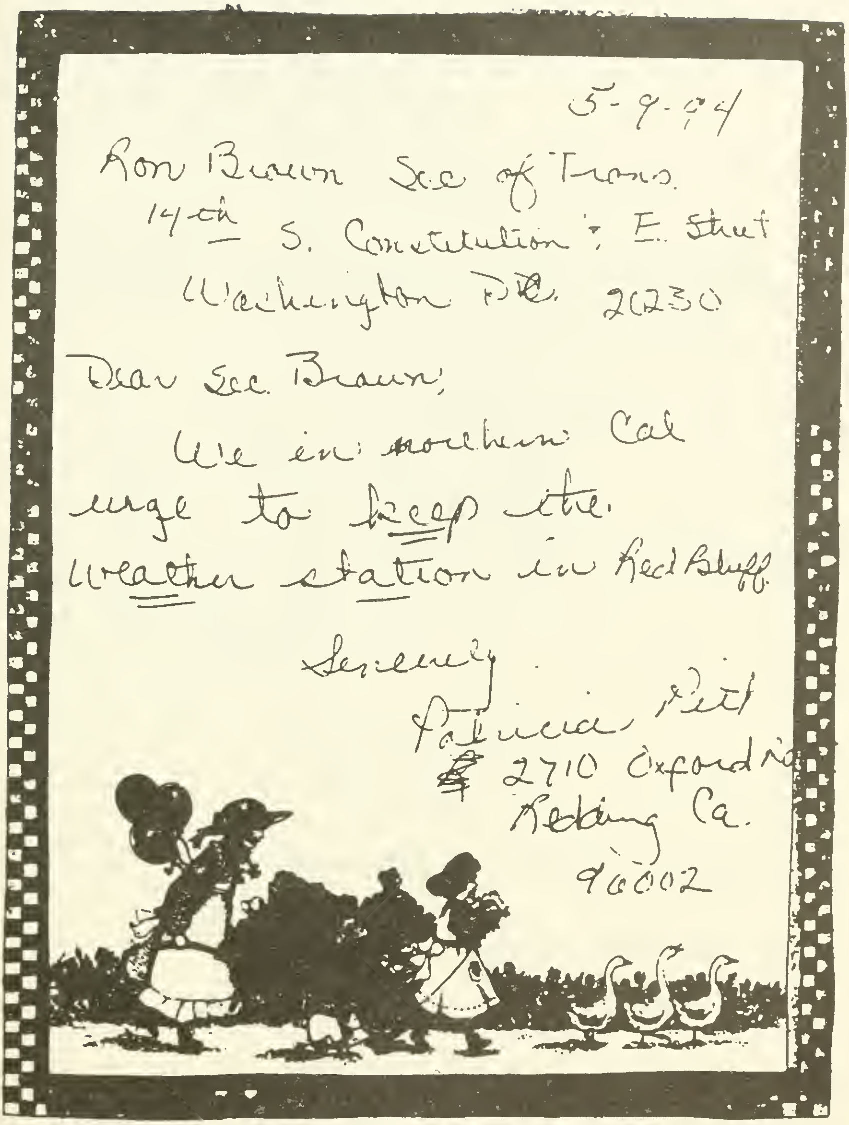
On behalf of the citizens in our area I am asking you not to close the National Weather Station located in Redding, California. The proposed modernization of the National Weather Service will leave 17,400 square miles of far nothern California not covered by NEXRAD.

The lack of accurate weather reporting in our rugged and varied topography will have serious consequences for interstate commerce, aviation, fire fighting, agriculture, and flood control. The potential losses due to weather related catastrophes that could be mitigated by accurate weather reporting far exceeds the costs of maintaining the Redding weather station.

Please keep this station open.

Sincerely,

David E. Klasson



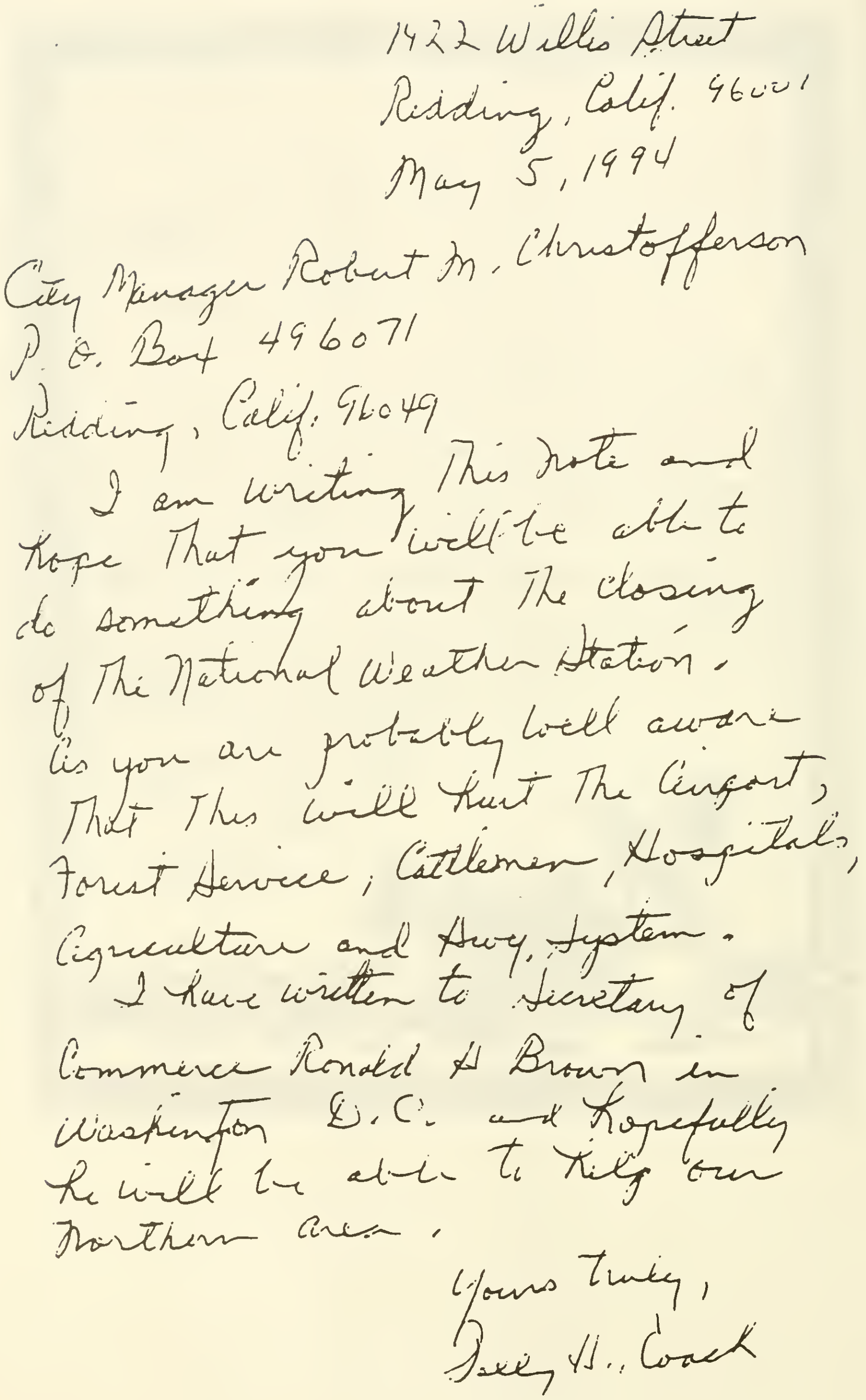
5-9-94

Ron Brown Sec of Trans.
14th S. Constitution & E. Street
Washington D.C. 20230

Dear Sec. Brown;

We in northern Cal urge to keep the weather station in Red Bluff.

Sincerely
Patricia Pitt
2710 Oxford R
Redding Ca.
96002



1422 Willis Street
Redding, Calif. 96001
May 5, 1994

City Manager Robert M. Christofferson
P. O. Box 496071
Redding, Calif. 96049

I am writing This note and hope That you will be able to do something about The closing of The National Weather Station.

As you are probably well aware That This will hurt The Airport, Forest Service, Cattlemen, Hospitals, Agriculture and Hwy. System.

I have written to Secretary of Commerce Ronald H Brown in Washington D.C. and hopefully he will be able to help our Northern area.

Yours Truly,
Jerry H. Couch

NEWS MEDIA COVERAGE

News Media Coverage

Record Searchlight, Article, "Weather Agency Delays Closings, will take NEXRAD Comments," October 5, 1994

Record Searchlight, Editorial, "NEXRAD Very Important to North State's Well Being," September 28, 1994

Record Searchlight, Article, "NEXRAD Chances Improve," August 26, 1994

United States Department of COMMERCE NEWS, "Science Group to Evaluate Weather Service Radar Coverage Plans Nationally," August 22, 1994

Record Searchlight, Article, "Forecast Better for Weather Site," August 21, 1994

Record Searchlight, Article, "Governor Wilson Supports Plea for Weather Station," July 30, 1994

U.S. Action Alert, U.S. Senate, California Unity Working Group, "NEXRAD Coverage Inadequate for Northern California," July 29, 1994

Congressman Wally Herger, 2nd District, California, *NEWS*, July 14, 1994

Record Searchlight, Article, "Group Hopes D.C. Trip Saved Weather Station," July 14, 1994

Record Searchlight, Article, "North State Lobbyists Hope to Weather NEXRAD Storm," July 12, 1994

Record Searchlight, Article, "Weather Station Lobbyists Plan Capital Trip," June 14, 1994

Record Searchlight, Article, "City Officials Lobby for NWS Office," May 18, 1994

Record Searchlight, Article, "White House May Decide Fate of Redding Weather Station," April 30, 1994

Record Searchlight, Article, "Fight Vowed to Keep Weather Office Open," April 7, 1994

Sacramento Bee, Article, "Gore Comforts Parents of Girl Killed by Tornado; He's Proposing Improved Weather Warnings," March 31, 1994

A-8 Redding Record Searchlight Wednesday, October 5, 1994

Weather agency delays closings, will take NEXRAD comments

■ Although the weather service hasn't scrapped its plan to close some 140 weather stations, it will provide a 60-day comment period before any closures.

By Bobby Calvan
R-S civic affairs reporter

The National Weather Service is expected to delay plans to close half of all weather stations across the country, including one in Redding, until communities are given a chance to comment on the proposed closures.

The announcement is expected to come today during a news conference in Washington, D.C., attended by weather service officials, a representative of Vice President Al Gore and a bipartisan coalition of members of Congress critical of the weather service's $500 million modernization plan.

That plan would eliminate 140 weather stations — about half the agency's offices — which won't be recipients of a $2.5 million Next Generation Radar (NEXRAD) system.

The decision to allow public comment comes after lobbying from lawmakers including Rep. Wally Herger, R-Marysville, campaigning for weather stations in their districts. Some in Congress credited Gore for interceding on behalf of communities.

"We think it's a better situation than we had," Herger aide Chuck Berwick said Tuesday. "It allows folks in Redding to give their public comment."

The weather service will provide residents 60 days to comment. The agency had already agreed to an independent review last month.

The agreements make legislative action unnecessary.

Rep. Bud Cramer, D-Ala., had sponsored a bill that, if passed, would have forced the weather service to provide a public comment period before closing any weather facilities. It also would have required the weather service to seek an independent review of its modernization plan to assure that closures would not "result in a degradation of existing service."

Although the weather service has not scrapped its modernization plan, its decision to hold public comment periods was hailed as an important victory by Herger and other legislators.

Shasta County Supervisor Francie Sullivan, who had traveled to Washington during the summer to lobby federal officials, reacted guardedly to the news.

"I want them to come out here and review the plan. I want to know in my heart that there won't be a degradation of service if we don't get a NEXRAD," she said.

NEXRAD technology is expected to give weather stations more accurate atmospheric data to predict weather.

But it does not automatically save weather stations from being shut down. Only stations targeted for modernization will remain open.

"If the weather service did not act, it would be facing members of Congress trying to earmark NEXRAD (funding) for their specific areas," said John Hay, a legislative aide for Cramer.

To save a weather station in Jackson, Ky., a Kentucky congressman slipped funding for a NEXRAD station into the federal budget.

News
Break

U.S. thinks O.J. guilty

R-S staff, news services

NEW YORK — By a 2-1 margin, Americans believe O.J. Simpson is guilty of murder, the Harris Poll was expected to report today.

The poll of 1,250 adults taken Sept. 17-21 found 50 percent saying Simpson is guilty, up from 38 percent in July. The other 50 percent split equally between those who think he is innocent and those who don't know.

In addition to the half who think the former football star murdered his ex-wife, Nicole Brown-Simpson, and her friend, Ronald Goldman, 4 percent think he committed a killing that was a lesser crime than murder.

Humphrey Taylor, who supervised the poll at Louis Harris and Associates, wrote in a column being released today that the findings show "the prosecution has been winning the public relations battle for the verdict of the American people," but that a poll can't measure how the jury will react in court.

Rodham easily

Executions

Continued from A-1

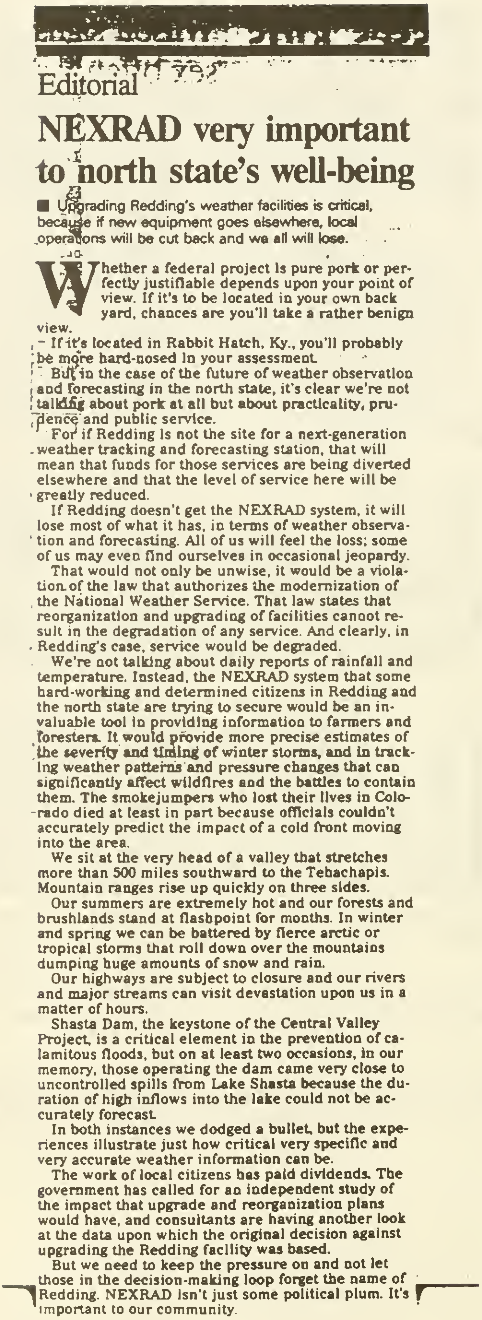
accountable for what it does, even to Death Row inmates."

Patel heard from a battery of

was persuaded by eyewitness accounts and state physicians' records of numerous past San Quentin executions, which reported apparent consciousness

son," the judge wrote. "There is a societal consensus that this method of execution is inhumane and has no place in civilized society."

Earlier this year, the 9th U.S.



Editorial

NEXRAD very important to north state's well-being

■ Upgrading Redding's weather facilities is critical, because if new equipment goes elsewhere, local operations will be cut back and we all will lose.

Whether a federal project is pure pork or perfectly justifiable depends upon your point of view. If it's to be located in your own back yard, chances are you'll take a rather benign view.

If it's located in Rabbit Hatch, Ky., you'll probably be more hard-nosed in your assessment.

But in the case of the future of weather observation and forecasting in the north state, it's clear we're not talking about pork at all but about practicality, prudence and public service.

For if Redding is not the site for a next-generation weather tracking and forecasting station, that will mean that funds for those services are being diverted elsewhere and that the level of service here will be greatly reduced.

If Redding doesn't get the NEXRAD system, it will lose most of what it has, in terms of weather observation and forecasting. All of us will feel the loss; some of us may even find ourselves in occasional jeopardy.

That would not only be unwise, it would be a violation of the law that authorizes the modernization of the National Weather Service. That law states that reorganization and upgrading of facilities cannot result in the degradation of any service. And clearly, in Redding's case, service would be degraded.

We're not talking about daily reports of rainfall and temperature. Instead, the NEXRAD system that some hard-working and determined citizens in Redding and the north state are trying to secure would be an invaluable tool in providing information to farmers and foresters. It would provide more precise estimates of the severity and timing of winter storms, and in tracking weather patterns and pressure changes that can significantly affect wildfires and the battles to contain them. The smokejumpers who lost their lives in Colorado died at least in part because officials couldn't accurately predict the impact of a cold front moving into the area.

We sit at the very head of a valley that stretches more than 500 miles southward to the Tehachapis. Mountain ranges rise up quickly on three sides.

Our summers are extremely hot and our forests and brushlands stand at flashpoint for months. In winter and spring we can be battered by fierce arctic or tropical storms that roll down over the mountains dumping huge amounts of snow and rain.

Our highways are subject to closure and our rivers and major streams can visit devastation upon us in a matter of hours.

Shasta Dam, the keystone of the Central Valley Project, is a critical element in the prevention of calamitous floods, but on at least two occasions, in our memory, those operating the dam came very close to uncontrolled spills from Lake Shasta because the duration of high inflows into the lake could not be accurately forecast.

In both instances we dodged a bullet, but the experiences illustrate just how critical very specific and very accurate weather information can be.

The work of local citizens has paid dividends. The government has called for an independent study of the impact that upgrade and reorganization plans would have, and consultants are having another look at the data upon which the original decision against upgrading the Redding facility was based.

But we need to keep the pressure on and not let those in the decision-making loop forget the name of Redding. NEXRAD isn't just some political plum. It's important to our community.

UNITED STATES DEPARTMENT OF
COMMERCE
NEWS
WASHINGTON, D.C. 20230

NATIONAL
OCEANIC AND
ATMOSPHERIC
ADMINISTRATION

NOAA 94-50

Contact: Barry Reichenbaugh (301) 713-0622

FOR IMMEDIATE RELEASE
8/22/94

SCIENCE GROUP TO EVALUATE WEATHER SERVICE RADAR COVERAGE PLANS NATIONALLY

The Commerce Department's National Weather Service today asked the National Research Council to conduct an independent assessment of the nation's modernized weather radar coverage.

"The performance of the new Doppler weather radar has exceeded our expectations and has already helped save lives and property damage," said Elbert W. Friday Jr., NWS director. "This is a major step forward in science, technology and our ability to predict the weather. However, the public is entitled to an independent assessment to ensure there is no degradation of service to all geographic areas of the nation."

Some members of Congress and community leaders have questioned whether all areas of the nation will be adequately covered.

The National Research Council will examine two issues: 1) whether the Doppler radar meets the statutory requirement of no degradation of service to all geographic areas; 2) how the Doppler radars have performed to date.

Doppler weather radar coverage is one of the central technologies of NWS modernization. This modernization is designed to replace outdated equipment and strategically place weather offices to improve the efficiency of weather services.

To date, the weather service has installed its new Doppler radar technology at 64 sites around the United States. Another 53 weather service radars are set for installation over the next two years. When the radar network modernization is complete in July 1996, the NWS will have overlapping coverage throughout much of the country, and coverage in areas of the western United States that have never before had weather radars. The NWS network will be supplemented by Doppler radars at 45 Department of Defense and Federal Aviation Administration sites.

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NEXRAD chances improve

■ Keeping the weather station open is critical to providing advance warning of foul weather for pilots, motorists and firefighters, advocates say.

By Dave Howland
R-S civic affairs reporter

A coalition of politicians and community leaders claimed a small victory Thursday in their fight to attract a $2.5 million radar weather station to the Redding area.

The National Weather Service announced this week an independent agency will review its $500 million modernization plan, which does not call for a state-of-the-art radar to forecast weather at low elevations in the Redding area.

U.S. Rep. Wally Herger, R-Marysville, said the review — to be conducted by the National Research Council — could help Redding win a Next Generation Radar (NEXRAD) to provide low-altitude forecasts.

"This doesn't mean that we're out of the woods," Herger said. "But we're one step closer."

A coalition of local, state and federal officials has been lobbying against a plan to eventually close the National Weather Service office in Redding. Members say a NEXRAD system is critical to providing advance warning of foul weather for pilots, motorists and firefighters.

According to a news release from the U.S. Department of Commerce, which regulates the National Weather Service, the National Research Council will seek to find out if the weather service modernization plan would lower the quality of forecasting in any area.

"The public is entitled to an independent assessment to ensure there is no degradation of service to all geographic areas of the nation," National Weather Service Director Elbert W. Friday Jr. said in a statement.

Herger said the law prohibits the weather service from lowering

timber sale was nurtured along through the regulatory and envi-

ing roads that could damage soils, forester Halderman said.

NEXRAD

Continued from A-1

the quality of its forecasting.

The National Research Council, a branch of the National Academy of Sciences, also will review the performance of the existing NEXRAD system.

Herger said a combination of political pressures convinced officials in the Department of Commerce to ask for the review.

Last month, Redding Mayor Bob Anderson and Shasta County Supervisor Francie Sullivan led a delegation to Washington, D.C., which lobbied the White House, Congress and Department of Commerce administrators.

The group gained the signatures of U.S. Sens. Dianne Feinstein and Barbara Boxer and six members of the House of Representatives on a letter to Department of Commerce Secretary Ron Brown asking for a NEXRAD station.

"I think we did have an impact," Anderson said. "I'd say this is good news. It's just a first step, of course, but it looks like we have the door open."

At the same time, Herger and Rep. Bud Cramer, D-Ala., have introduced legislation calling for an independent review and tougher standards to evaluate the weather service modernization plan.

The bill is designed to help Northern California and areas in 10 states, including Alabama.

RS 8/26/94

Forecast better for weather site

■ The National Weather Service is planning to close half of its offices nationwide, including one in Redding, as part of a modernization plan.

By Bobby Calvan
R-S civic affairs reporter

The National Weather Service may find it tougher to eliminate 140 of its offices targeted for closure, including one in Redding, if federal legislation introduced last week is passed.

If approved, the measure would force the weather service to prove that its $500 million modernization plan, which will phase out some weather service offices, won't leave communities out in the cold.

"The pressure's being increased on the (weather service) to do the right thing," said Rep. Wally Herger, R-Marysville, a co-sponsor of the bill introduced in the House Friday by Rep. Bud Cramer, D-Ala.

The legislation would also require an independent study showing the plan won't "result in a degradation of existing service."

The bill reportedly has the support of the White House and its passage is said to be probable because of bipartisan opposition to the planned closure of many weather offices.

"I'm optimistic something good is going to happen from this," Chris Fontana, the chief meteorologist at the Redding weather station, said Saturday.

Fontana and local politicians — with the help of Herger, Rep. Vic Fazio, D-West Sacramento, and California's two U.S. senators — have been lobbying the weather service to modernize the Redding facility, along with hundreds of others. Those that aren't targeted for modernization will eventually be closed.

Modernization includes installation of a Next Generation Radar (NEXRAD) system, which is expected to improve weather detection and forecasting. Under its modernization plan, only half of the existing weather stations will receive the state-of-the-art radar, which costs $2.5 million each.

Redding Mayor Bob Anderson and Shasta County Supervisor Francie Sullivan traveled to Washington, D.C., a month ago to lobby the White House, congressional leaders and government administrators to keep Redding's weather station open.

They went with maps to show that the area's nearby mountains prohibit weather stations in Eureka, Sacramento and Medford, Ore., from providing the same accuracy as readings from the existing Redding facility.

The gap in coverage could pose problems for residents and road crews in times of storms, and

See NEXRAD, A-14

RS
Aug 21,
1994

NEXRAD

Continued from A-1

could leave firefighters without advance warning of severe weather patterns.

The bill, which could go before committee as soon as early next month, is designed to help Northern California as well as areas in 10 states, including Cramer's own state of Alabama.

The legislation calls for public review of the plan biennially, including an inspection two years after the modernization plan has been fully implemented. Each review is to be followed by an independent study considering the impacts of closing any local weather service office.

Cramer enlisted the support of Vice President Al Gore for the legislation following Gore's visit to northeastern Alabama after Palm Sunday tornadoes killed 44, mainly in Alabama and Georgia, according to a Scripps Howard News Service report.

Gore's and Cramer's offices are also discussing "an independent review of the entire modernization plan," said John Hay, legislative assistant for Cramer.

Gov. Wilson supports plea for weather station

■ If the airport station closes, the Redding area will have to rely on forecasts from facilities in Sacramento, Eureka and Medford, Ore.

Republican Gov. Pete Wilson joined Democratic Sens. Barbara Boxer and Dianne Feinstein and Rep. Wally Herger, R-Marysville, in urging federal officials to keep Redding's weather station open.

"I am deeply concerned that the pending closure of the (National Weather Service) office in Redding will leave a large area of California without weather radar coverage," Wilson said in a letter addressed to Commerce Secretary Ron Brown, who has jurisdiction over the weather service.

Earlier this month, Boxer and Feinstein joined Herger and Rep. Vic Fazio, D-West Sacramento, in writing a letter advocating that a state-of-the-art radar system, known as NEXRAD, be installed at Redding's weather facility.

The weather service is planning to close dozens of weather stations nationwide, including one in Redding. Facilities that aren't recipients of NEXRAD technology will be targeted for closure.

In their letter, the members of Congress urged Brown to reconsider the planned closure of the Redding facility because of the north state's risk of forest fires.

"The recent deaths of 14 firefighters in Colorado due to what appears to be unreported wind gusts highlight the urgency of this letter to you. The same weather irregularities are unusually common in the north valley areas of California which along with other vital factors, might not have been fully considered," the delegation wrote.

If the Redding facility closes, the Redding area will have to rely on coverage from weather stations in Sacramento, Eureka and Medford, Ore.

Deputies

dedication."

RS July 30, '94

BARBARA BOXER
CALIFORNIA

COMMITTEE ON ENVIRONMENT
AND PUBLIC WORKS

COMMITTEE ON BANKING,
HOUSING, AND URBAN AFFAIRS

COMMITTEE ON THE BUDGET

JOINT ECONOMIC COMMITTEE

DEPUTY WHIP

United States Senate
HART SENATE OFFICE BUILDING
SUITE 112
WASHINGTON, DC 20510-0505
(202) 224-3553

1700 MONTGOMERY STREET
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SAN FRANCISCO, CA 94111
(415) 403-0100

2250 EAST IMPERIAL HIGHWAY
SUITE 545
EL SEGUNDO, CA 90245
(310) 414-5700

525 B STREET
SUITE 990
SAN DIEGO, CA 92101
(619) 239-3884

2500 TULARE STREET
SUITE 160
FRESNO, CA 93721
(209) 497-5109

ACTION ALERT

July 29, 1994

CALIFORNIA UNITY WORKING GROUP

Senator Barbara Boxer, Chair
Senator Dianne Feinstein, Co-Chair

House Co-Chairs	House Co-Chairs
Hon. Howard Berman	Hon. Duncan Hunter
Hon. Cal Dooley	Hon. Nancy Pelosi
Hon. Wally Herger	Hon. Ron Dellums

"NEXRAD COVERAGE INADEQUATE FOR NORTHERN CALIFORNIA"

ISSUE

The national network of Next Generation Radar (NEXRAD) systems being developed by the U.S. Weather Service could leave a gap in coverage for Northern California. There are serious concerns that the five NEXRAD units proposed for the northern California, southern Oregon and Nevada regions might not fully serve the mountainous Redding/Red Bluff region.

Such a gap could have adverse consequences for wildlife and agricultural forecasting and general aviation safety. For example, 14 U.S. Forest Service firefighters recently lost their lives because of unreported high wind gusts. We cannot allow this type of tragedy to repeat itself -- in northern California or in any other region of this nation.

ACTION

Write Secretary of Commerce Ron Brown and ask him to help ensure that the Redding area is adequately covered by NEXRAD. You can reach him at:

The Honorable Ron Brown
Department of Commerce
14th and Constitution, N.W.
Washington, D.C. 20230

Enclosed is a copy of a letter already sent by members of the California Delegation to Secretary Brown. If you have any questions, please call Chuck Berwick in Congressman Herger's office at 5-3076 or Rob Alexander in Senator Boxer's office at 4-3901.

Wally
Herger
Congressman
2nd District • California

NEWS

547-4353

Contact: Roger Mahan
(202) 225-3076

NEXRAD GROUP CONCLUDES WASHINGTON MEETINGS

(July 14, 1994 -- Washington, D.C.) A group of officials from the Redding area seeking to bring a NEXRAD weather radar to the North Valley has concluded three days of meetings with federal officials in Washington, D.C.

The group, which has worked closely with Rep. Wally Herger on this issue, includes Robert Anderson, Mayor of Redding; Francie Sullivan, Chair, Shasta County Board of Supervisors; Bill Henning, retired National Weather Service meteorologist; and Jerry Fikes, Emergency Services Director, Mercy Air Ambulance.

"The NEXRAD meetings of the past three days have gone very well. The arguments of the NEXRAD group have been very compelling, and I'm heartened by the responses we've received from the White House, our two senators, and other members of Congress with whom we've met. If Redding doesn't get a NEXRAD, it won't be because of lack of effort."

"We have the facts and science on our side, and if the decision is made on a fair and impartial basis, Redding should get a NEXRAD. But we must remember that we still have an uphill battle to fight. The placement of a NEXRAD radar in the North State remains a top priority for me."

During its three days in Washington, the group met at the White House with Marsha Scott, Deputy Assistant to the President; Senator Barbara Boxer; Michael McGill, Chief of Staff for Senator Diane Feinstein; David Barrum, Deputy Secretary of Commerce; Rep. Vic Fazio; Rep. George Brown, Chairman of the Science, Space and Technology Committee; Rep. Bill Baker, Science, Space and Technology Committee; Rep. Ralph Hall, Space Subcommittee Chairman; Rep. Jim Sensenbrenner, Space Subcommittee; Rep. Dana Rohrabacher, Space Subcommittee; Rep. Ed Royce, Space Subcommittee; Curt Stanford, Space Subcommittee staff; Lou Boezi, Deputy Assistant Administrator for Modernization for National Oceanic and Atmospheric Administration (NOAA)/National Weather Service; and David Wetmore, Executive Director of Governor Wilson's Washington, D.C., office.

Group hopes D.C. trip saved weather station

Officials from Redding, county met with White House officials

- If Redding's weather station is closed, area residents would have to rely on weather information from Sacramento, Eureka or Medford, Ore.

By Bobby Calvan
R-S civic affairs reporter

A delegation of Shasta County officials returned from Washington, D.C., Wednesday night more hopeful than ever that federal officials will reconsider the planned closure of Redding's weather station.

"We've gone from a done deal to a hopeful situation," said Supervisor Francie Sullivan, who traveled with Redding Mayor Bob Anderson and two others to the nation's capital to gain help in keeping the facility open.

During its three-day trip, the contingent met with White House officials, congressmen and California's two Democratic senators.

The delegation, however, left with no assurances that the Redding weather station would remain open.

"We knew back from the beginning it's going to be difficult," Sullivan said. "But we're heartened that we've gotten so much support."

White House assistant Tim Flynn, who met with Sullivan and Anderson on Monday, said there was no time line on making a decision. He said the group made a "compelling" case, but declined to speculate on whether Shasta County officials might eventually be successful.

As many as 11 weather stations are targeted for closure in California.

The key to keeping the Redding weather station open is landing one of 116 state-of-the-art Next Generation Radar (NEXRAD) stations that are being placed at selected weather facilities.

If Redding's station is closed, area residents would have to rely on weather information from Sacramento, Eureka or Medford, Ore.

NEXRAD equipment allows weather stations to provide detailed information about low-altitude winter storms that could potentially clog Interstate 5 with snow, particularly along the upper Sacramento River canyon. And it could be a valuable tool for firefighters who need the most accurate information on winds fanning wildland fires.

The Shasta County contingent has enlisted the support of both California senators, Barbara Boxer and Dianne Feinstein, as well as Rep. Wally Herger, R-Marysville, and Rep. Vic Fazio, D-West Sacramento.

All four politicians were expected to send a letter to the White House, urging that the Redding station remain open.

RS July 14, 1994

RS 1/12/94

RS 1/12/94

North state lobbyists hope to weather NEXRAD storm

In an age of downsizing, the federal government is closing as many as 11 weather stations in California, including one in Redding.

By Bobby Calvan
R-S civic affairs reporter

They packed high hopes and an assortment of maps for their journey to Capitol Hill. And when they leave Wednesday, a four-member north state contingent hopes to bring home assurances at Redding's weather station ill remain open.

The three-day trip began with promise, according to Redding Mayor Bob Anderson, who was accompanied by Shasta County Supervisor Francie Sullivan and two others for the lobbying effort.

"I feel very encouraged right now," Anderson said Monday afternoon after meetings with White House deputy assistant Marsha Scott and the congressmen who may help decide the fate of the local weather station.

North state officials are lobbying for one of 116 state-of-the-art Next Generation Radar (NEXRAD) stations that are being placed at selected weather facilities. Those that aren't on the NEXRAD list — including Redding — will eventually be closed.

Local officials, though, are trying to fight the closure, saying that a Redding station is crucial because of the area's crops, wildland fire hazards and geography.

More meetings are planned, including separate sessions this afternoon with California Sens. Barbara Boxer and Dianne Feinstein.

On their first day, the Shasta County delegation also met with California Rep. George Brown, D-Colton, chairman of the House Science, Space and Technology Committee. They began their day with a strategy session with Rep. Wally Herger, R-Marysville.

Anderson and Sullivan were especially encouraged by how much time the White House agreed to give the visiting delegation.

They showed Scott, the White House deputy, maps of the area's terrain, arguing that the nearby mountains prohibit weather stations in Eureka, Sacramento and Medford, Ore., from providing the same accuracy as readings from the existing Redding weather station.

"We were encouraged because we spoke with (Scott) for so long," said Anderson.

Sullivan and Anderson, along with Jerry Fikes of Mercy Medical Center in Redding and retired weather forecaster Bill Henning, attempted to impress those they visited with the importance of Redding's weather station.

"The halls are full of people trying to present their issue. My old story is that service is given to those who show up," said Sullivan, explaining the importance of the Capitol visit.

"We don't believe that (federal officials) intend to do what will happen to us," Sullivan said.

While Sullivan and Anderson said they were optimistic, Herger was much more cautious.

"We're fighting a battle," he said. "The big problem we're finding is the (federal) budget."

But Herger said the north state has a strong case for being included on the NEXRAD list.

NEXRAD equipment allows weather stations to provide detailed information about low-altitude winter storms that could potentially clog Interstate 5 with snow, particularly along the upper Sacramento River canyon.

It also will allow weather forecasters to give better warning of heavy thunderstorms like those that flooded the Redding area early last year.

And it could be a valuable tool for firefighters who need the most accurate information on winds that could fan wildland fires.

"I think we have a fighting chance in getting it," Herger said. "But this is not a slam-dunk deal. We knew that from the beginning."

Despite her optimism, Sullivan agreed that the fight will be a tough one.

The decision to close the Redding weather station has already been made, she said. "We're just trying to undo it," she said.

If the weather station closes, the area will lose 10 jobs.

Weather station lobbyists plan capital trip

■ The Redding delegation will try to persuade officials in Washington, D.C., to buy an expensive, high-tech weather radar to help farmers and pilots.

By Dave Howland
R-S civic affairs reporter

Redding Mayor Bob Anderson and a veteran meteorologist will travel to the White House next month to try to convince officials to keep open the National Weather Service office at Redding Municipal Airport.

The City Council voted unanimously Monday to send Anderson and retired Sacramento and Eureka weather service meteorologist Bill Henning to Washington next month to lobby for a sophisticated weather-detecting radar that could ensure the Redding office stays open, according to City Manager Robert Christofferson.

The two will likely join Shasta County Supervisor Francie Sullivan and Red Bluff City Councilman Ryan Sale in pleading for a north state-based Next Generation Radar (NEXRAD), which they contend is needed to help fight dangerous wildfires and prevent weather-related aircraft accidents.

Working from the office of Rep. Wally Herger, R-Marysville, the delegation is expected to meet with California Sens. Dianne Feinstein and Barbara Boxer, U.S. Department of Commerce officials and aides to President Bill Clinton, according to Christofferson.

Redding will pay the bill for Anderson and Henning's trip, which is expected to total about $3,000. Despite skepticism from some council members, Christofferson has stressed Redding would stand the greatest chance of winning the radar by lobbying in person.

Christofferson said Henning, a Redding resident, would be able

Monday he started seeking appointments in the capital only hours after the council approved Anderson's and Henning's trip. Magill said the delegation will not waste time knocking on doors or sitting in waiting rooms, but instead split its time between lobbying and plotting strategy at Herger's office.

"It's not a hit-or-miss operation," he said. "We are going to try to make it as productive and effective a visit as possibly can be put together. It's extremely helpful to bring local representatives in to make their own case — that, I believe, always gets the attention of the people in Washington."

Magill said he is planning the meetings for July 12-14, a week after Congress returns from its Fourth of July recess.

This morning, Shasta County supervisors were scheduled to vote on whether to send Mrs. Sullivan to Washington. The delegation also may be joined by a representative of Mercy Medical Center in Redding, which relies on accurate forecasts for safe air ambulance flights, Christofferson said.

North state officials are upset with a National Weather Service plan to close its office at the Redding airport by 1996 under a nationwide consolidation plan. Forecasting would ultimately be provided from Sacramento.

Christofferson and others dispute weather service contentions that radars in Sacramento, Oroville, Eureka, Reno and Medford, Ore., will adequately forecast Redding-area weather.

A new plan is being considered to keep at least three forecasters at the Redding office beyond 1996 to report local weather conditions to farmers and firefighters, weather service area manager Norm Hoffman said Monday. The office employs 10.

All others who use the service would have to contact Sacramento for forecasts, he said. Hoffman said the skeleton staff would work until new computer systems can replace them, possibly by the year 2000.

He added that contrary to the opinions of north state officials, forecasts will be far more accurate with the help of NEXRAD radars and other weather-detecting device called Automated Surface Observing Systems.

Hoffman said the Weather Service has no choice but to cut employees under an order from Congress to shave its budget by 12 percent by 1999.

"This plan is set up to cover everybody with good, solid professional weather service," he said. "It's in line with what the (federal) administration is asking."

RS 6/14/94

City officials lobby for NWS office

■ By tapping sources in the White House and Commerce Department, the city hopes to prevent an "intolerable and life-threatening situation."

By Dave Howland
R-S civic affairs reporter

Stepping up efforts to save the National Weather Service office at the Redding Municipal Airport, the City Council has begun a campaign to lobby the federal officials who can keep it from closing.

The Redding City Council voted unanimously Tuesday to send a four-page letter to U.S. Commerce Secretary Ron Brown, urging him to block the threatened closure of the National Weather Service in Redding and instead provide the area an expensive and accurate forecasting tool — a Next Generation Radar (NEXRAD).

The letter, drafted by a task force of community leaders, states that without the radar, which is required under a National Weather Service modernization plan, the Redding forecast office likely will close in a few years.

"This will leave an intolerable and indeed life-threatening situation that will affect the general economy of the region, already reeling from disastrous cutbacks in the timber industry and other economic downturns," the letter states.

Local officials contend that to cut the forecasting service would cut the area's ability to predict potentially-hazardous weather that could destroy crops, flood homes, fan wildfires and force aircraft into mountains.

The task force recommended in a report that the council send several copies of its letter to contacts across Washington, D.C., including White House staff member Tom Epstein, "predicated on the White House's sensitivity to the extreme need to carry California in the next election."

The council agreed also to consider sending its own representatives to the capital or, as an option, hold a tele-conference to state their case.

"It seems to me there comes a time when we should look them in the eyeball and say, 'We need your help,'" Councilman Ken Murray said.

Mayor Bob Anderson directed city staff to consult with Shasta County Supervisor Francie Sullivan — who is visiting the capital on other business — about the "political feasibility" of sending a delegation.

City Manager Robert Christofferson said the city has exhausted its appeals to the National Weather Service administration.

Already, the city has won support from Democratic senators Dianne Feinstein and Barbara Boxer, and Rep. Wally Herger, R-Marysville, and Rep. Vic Fazio, D-West Sacramento.

Christofferson said the city has "contacts" at the Department of Commerce and the White House that can draw attention to the issue.

"We are using some back channels that sound very promising," he told the council. "I think if we can move ahead on this we can keep the weather station."

Redding Record Searchlight Saturday, April 30, 1994

White House may decide fate of Redding weather stati

■ The task force will make recommendations to the Redding City Council and ask what steps to take next in the fight to save the weather service office.

By Robert C. Holquist
R-S health & environment reporter

The Redding city manager said President Clinton's desire to carry California in the 1996 presidential election may be the key to keeping open the National Weather Service office in Redding.

"Oddly enough, something really as small as this issue will probably be decided in the White House," Redding City Manager Robert Christofferson said Friday.

A growing circle of agencies and interest groups that depend on the Redding weather service office are getting involved in the effort to keep the facility open, which is scheduled to close in 1996.

Christofferson, who heads a task force looking for ways to bring a Next Generation Radar (NEXRAD) to the north state, said saving Redding's weather office will be a political decision made at the highest levels of the federal government.

Chris Fontana, meteorologist in charge of the National Weather Service office at the Redding Municipal Airport, said weather service employees share a morbid joke that it takes a disaster like a church getting hit by a tornado or an airliner crashing before the agency responds to community concerns.

Fontana said a disaster March 27 near Huntsville, Ala., in which 20 people were killed when a tornado hit a church, captured nationwide attention. The weather service office in Huntsville is also scheduled to close.

"The three most talked-about cities right now in the weather service are Fort Wayne, Ind., Huntsville, Ala., and Redding, Calif.," Fontana said. All three cities stand to lose weather offices under a national modernization program.

Fontana warned that the agency could technically meet the requirements of the law Congress passed authorizing the modernization of the weather service by keeping the Redding weather office open, but leaving no one there to operate it.

"That's a standard federal practice of 'zero staffing' and not closing," Fontana said.

And once an office is closed, it will be virtually impossible to reopen it, Fontana said.

Under the weather service plans, offices across the nation that do not receive a NEXRAD will close. Task force members have argued that NEXRADs in Eureka, Sacramento, Reno, Paradise, Beale Air Force Base and Medford, Ore., will not adequately cover the north state because of interference from mountains.

The task force estimates the area left unprotected by NEXRAD radars under the current weather service plan includes 17,400 square miles
north state, stretching from
ding to the Oregon border u
Sacramento River canyon a
around Lake Shasta.

"If they just came up with
extra radar out of the spare par
put it in Red Bluff, and ran
from the existing weather servi
station in Redding, you'd have
made," Christofferson said.

Shasta County Supervisor
cie Sullivan recommended
task force write a letter to
company a stack of letters be
collected from various agen
and businesses that could s
the office closes.

The Redding City Council
consider the subject at a meetin
in May

Motorcyclist deaths at 28-year low

SACRAMENTO (AP) — Motorcyclist deaths last year were at their lowest level since 1966 and injuries continued to decline, the California Highway Patrol said Friday.

number of riders were being trained through the state's official training courses.

Candidate Brown

RS
4/30/9

Fight vowed to keep weather office open

North state officials are ready to "go to the barricades" to keep the National Weather Service from closing its office at Redding Municipal Airport.

A task force spearheaded by Redding City Manager Robert Christofferson met Wednesday to begin mapping strategy aimed at convincing the federal agency to install sophisticated weather radar in the north state and keep the office open.

"I think we're ready to go to the barricades to make sure we take the best possible shot" at saving the office, Christofferson said.

About 20 people from various north state agencies met at City Hall to discuss strategy. The task force is trying to persuade the weather service to locate a Next Generation Radar (NEXRAD) system somewhere in the north state.

The weather service is modernizing and restructuring its nationwide network of offices around a grid of 116 NEXRAD sites. Some 134 weather service offices in places not scheduled to receive a NEXRAD system will be closed under the plan.

"That leaves this area unprotected," Christofferson said.

Weather service officials claim NEXRADs in Eureka, Sacramento, Beale Air Force Base in Marysville, Medford, Ore., and Reno would provide adequate coverage for Redding and the rest of the north state. Forecasting duties for the entire north state will be handled in Sacramento if the Redding weather service office closes as scheduled in 1996.

But Christofferson has argued that radars in the faraway cities can't see through mountains and won't be as able to accurately predict north state weather as a Redding office.

Red Bluff City Councilman Ryan Sale said the weather service lied to the people of Red Bluff in 1985 when it told them they would get better service by closing the Red Bluff office and opening a consolidated office in Redding.

"You cannot play the genteel political game any longer with these folks, because they're just going to wait you out," Sale said.

Sale said agricultural and aviation interests in the north state need "real time" weather reports.

Chris Fontana, meteorologist in charge of the Redding weather service office, said the Redding office would be the largest one closed in the Western United States.

Sacto Bee 3/31/94

Gore comforts parents of girl killed by tornado

By Ron Fournier
Associated Press

PIEDMONT, Ala. – Carrying a promise of federal help to the tornado-swept Southeast, Vice President Al Gore stood in the ruins of a country church Wednesday and called the preacher couple whose daughter died in the rubble "a lesson in grace."

The series of tornadoes Sunday that killed at least 43 people in Alabama, Georgia, Tennessee, North Carolina and South Carolina left the darkest mark here at the Goshen United Methodist Church, headed by the Rev. Kelly Clem. Twenty worshipers, including Clem's 4-year-old daughter, died when the church roof collapsed Sunday.

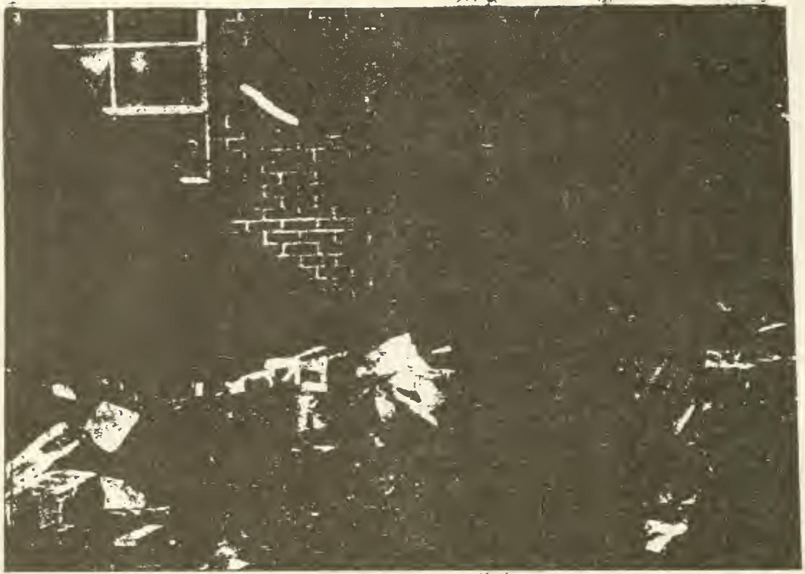
President Clinton declared Alabama a major disaster area Wednesday, making federal financing available to affected individuals and local governments.

"I'm in awe of the strength and grace you've shown through this," Gore said, grasping Clem's hand during a quiet moment on the grounds of the ruined church. "It's uplifting."

Her husband, the Rev. Dale Clem, said he recalled how Gore rearranged his life around his family after his son, Albert, nearly died after being hit by a car.

"That has been an inspiration to me," Dale Clem told Gore, explaining how he's coping with the death of his daughter, Hannah. Dale Clem heads a youth ministry at Jacksonville

Please see GORE, Back page, A22



Associated Pres

Vice President Al Gore consoles the Revs. Kelly and Dale Clem at the church in Piedmont, Ala., where their daughter was killed Sunday

Gore: He's proposing improved weather warnings

Continued from page A1

State University.

Visibly moved, Gore paused and said, "That really changes your perspective."

The couple took Gore on a brief tour, stepping over a large sheet of foam rubber, twigs, balls of paper and bits and pieces of the church. Kelly Clem's eyes were badly swollen and her forehead was bruised from injuries sustained in the tornado.

"There was no warning," she told Gore softly, pointing to her church's roof, now spread flat on the ground.

At one point, Gore stepped inside the police rope and roamed a few feet into the rubble, getting a closer look at the debris that caved in on the congregation. Kelly Clem, shaking, cautiously ventured in with him.

She cried softly later, as Gore commended the couple in brief remarks to reporters. "On behalf of the country, I want to thank you for this lesson in grace," he said.

The couple has conducted dozens of interviews, becoming the most visible image of the tragedy while grieving their loss and helping the congregation cope.

Gore told reporters he would announce today a proposal to improve severe weather forecasting in rural areas. Without elaborating, Gore said, "One of the lessons our nation must learn from this tragedy is we must do a better job of providing severe weather warnings to communities."

A White House official, speaking on condition of anonymity, said the proposal would use satellite technology and inexpensive transistor radios to notify rural residents of weather problems. These radio stations send out a tone when a warning is issued, and radio sets are available that turn on automatically when this tone is sent.

The National Weather Service and Federal Emergency Management Agency have been discussing a plan to build a national warning program on this radio network.

The vice president said the government did not know yet how much money would flow to the tornado-damaged area.

Exhibit 1

"Weather Radar Coverage Assessment Map"

EXHIBIT 1

Enclosed with this letter is a map titled "Weather Radar Coverage Assessment Map." The purpose of the map is to assess the effective coverage of weather radar across Far Northern California, an area equal in size to the state of Ohio. Unlike the Midwest and other flat areas, there are barriers to effective weather radar coverage in Far Northern California as a product of mountains, distance, weather radar characteristics, and the sites selected for weather radar.

The map illustrates the complexity of the geography of the area and the effect of this topography and distance upon radar. The map shows the location of the proposed weather radar sites and their theoretical coverage of 130 miles. The map also shows the effective coverage area based upon the following factors:

- Full-beam coverage below 10,000 feet based on the elevation of the radar site.
- The screening effect of mountains.
- The lowest angle of inclination of the radar beam.

The result is that high-level coverage is adequate over most of the area; but coverage below the tops of the mountains—or the bulk of the area—is almost nonexistent for about 20,000 square miles.

The map also shows the site of a proposed radar station to the west of Red Bluff which would cover the metropolitan area of the Upper Sacramento Valley and two commercial airports. This site is suggested since it is about half way between the Medford and Sacramento radar sites; however, other sites are possible that would provide effective coverage of the north end of the Sacramento Valley below the top of the summits surrounding the valley.

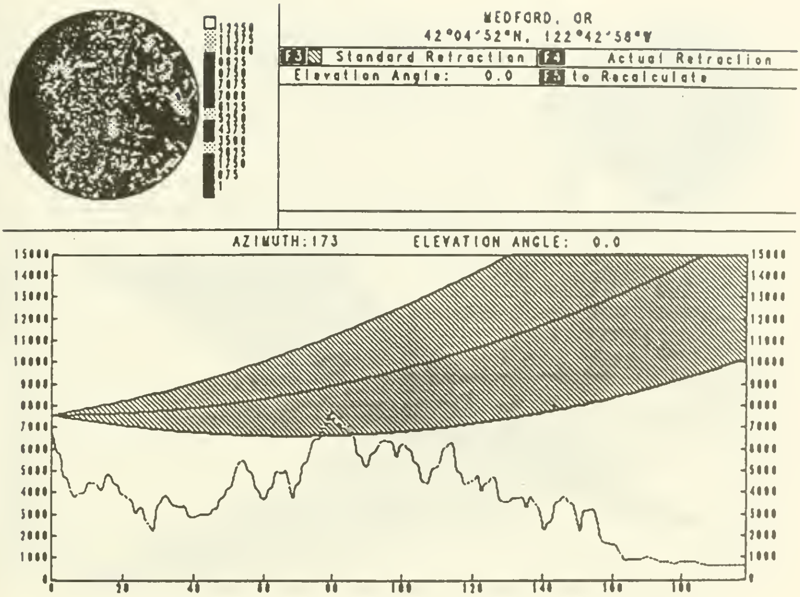
By way of an analogy, think of the Sacramento Valley as a bathtub. The walls of the bathtub are the surrounding mountains—to the east, the Sierra Nevada and Southern Cascades, to the north, the Cascade Mountains, and to the west, the Coastal Ranges.

To the south, the bathtub is open and drains to the Sacramento area. The south half of the bathtub is covered by the Sacramento radar site, covering the bottom of the tub. The upper part of the tub, the Upper Sacramento Valley is too far to the north to be covered by the Sacramento radar and is screened by the surrounding mountains from radar sites on the other side of the mountains to the west, north, and east.

The result is high-elevation coverage of convectional storms, but ineffective coverage by radar of lower level cyclonic storms, radiation, fog, inversions, smoke from forest fires, thunderstorms at the north end of the valley, frost conditions, etc.

The cross sections below the map illustrate this topography and the bowl which is the Sacramento Valley and the complexity of topography across the area. Also attached are radar-beam patterns and refractions from the radar sites and maps depicting predominant wind patterns in California. Interesting to note is that the wind patterns of the Upper Sacramento Valley are just the opposite of those of the Lower Sacramento Valley. The line of coverage lies just past the effective range of the Sacramento radar. The Upper Sacramento Valley also has the highest potential for air inversion in the United States, which affects pollution levels, burn days, and frost conditions.

6-9-94
LTR94\RADARCVG.MAP

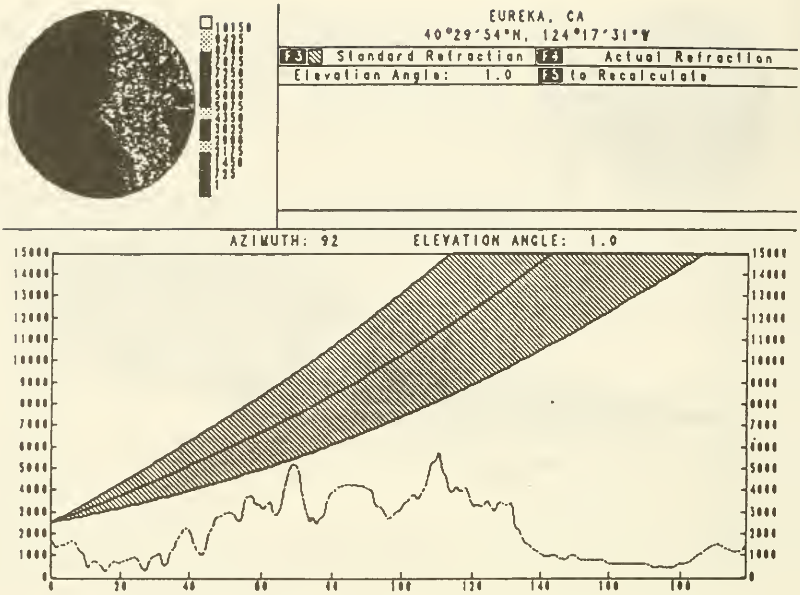


MEDFORD, OR
42°04'52"N, 122°42'58"W

F3 ▧ Standard Refraction F4 Actual Refraction

Elevation Angle: 0.0 F5 to Recalculate

AZIMUTH:173 ELEVATION ANGLE: 0.0

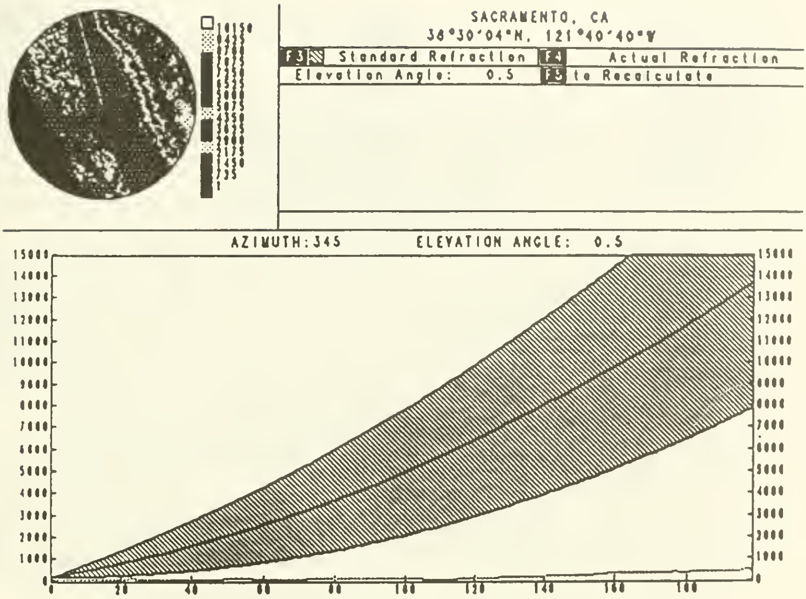


EUREKA, CA
40°29'54"N, 124°17'31"W

F3 ▨ Standard Refraction F4 Actual Refraction

Elevation Angle: 1.0 F5 to Recalculate

AZIMUTH: 92 ELEVATION ANGLE: 1.0



SACRAMENTO, CA
38°30'04"N, 121°40'40"W

F3 ▨ Standard Refraction F4 Actual Refraction
Elevation Angle: 0.5 F5 to Recalculate

AZIMUTH:345 ELEVATION ANGLE: 0.5

WALLY HERGER
2D DISTRICT CALIFORNIA
PLEASE REPLY TO
☐ WASHINGTON OFFICE
2433 RAYBURN HOUSE OFFICE BUILDING
(202) 225-3076
DISTRICT OFFICES
☐ 66 INDEPENDENCE CIRCLE, SUITE 104
CHICO, CA 95926
(916) 893-8363
☐ 410 HEMSTED DRIVE, SUITE 115
REDDING, CA 96002
(916) 223-5898

COMMITTEE ON
WAYS AND MEANS

COMMITTEE ON
THE BUDGET

Congreſs of the United States
House of Representatives
Washington, DC 20515–0502

December 5, 1994

Julie Scanlon
National Weather Service
1325 East-West Highway #9372
Silver Spring, Maryland 20910

Dear Julie:

I would like to take this opportunity to participate in the sixty day comment period on the National Weather Service's proposed modernization plan. As you know by now, there is tremendous concern within the Redding community of my northern California district that the NWS' plan will have a detrimental impact on weather services in our area.

The current modernization plan would severely limit the role of the Redding Weather Station beginning as early as 1996. According to the plan, the Redding area would gather its weather observation information from NEXRAD equipment in five areas encompassing three states. I have deep concerns about the ability of these five stations located in Medford, Oregon; Reno, Nevada; Eureka, California; Oroville, California and Sacramento, California to fully service the Redding region's unique and often severe weather patterns.

For example, not only are the coastal patterns in Eureka far different from those in Redding, but it is our understanding that the NEXRADs are required to be spaced for a range of no more than 150 miles to assure accurate coverage. Since Eureka is 160 miles from Redding, with 7,500 to 9,050 foot peaks of the Klamath Mountains lying between the two cities, I question whether radar located at this great distance over such rough terrain can accurately detect the severe weather patterns that the Redding area experiences.

The situation has recently become even more severe due to reports that the NEXRAD weather radar slated for Oroville could be delayed by as much as 18 months because of environmental concerns. The construction snag, which will leave the Redding area and much of northern California even more exposed, came when federal agencies became concerned about an access road that may have disturbed a man made vernal pool that could be home to the endangered freshwater fairy shrimp. I cannot understand why a project which is of vital public safety to our agriculture-based economy is being held hostage to a shrimp which, incidently, exists by the millions throughout vast sectors of the state.

The Redding Municipal Airport where the local weather station is located is the focal point for air transportation to seven counties in northern California with a population base exceeding 450,000. It is geographically in the center of the ground transportation network of highways, railroads and at the headwaters of the Sacramento River. I am extremely concerned about the potential safety hazards should this weather facility be downsized.

Accurate and constant weather coverage of the seasonal fires and winter flood and snow conditions is vital to the survival of the agricultural and timber industries in northern California. Even with the present coverage, well over 700,000 acres of forests have been burned in recent years. The already struggling timber dependent community in this region simply cannot afford additional burned acreage due to insufficient weather observation coverage.

According to the NOAA Authorization Act of 1992 (P.L. 102-567), certification that a community dependent on a weather station scheduled for closure will not experience any degradation of services is required before any downsizing of that facility can begin. I cannot imagine any scenario in which the Department of Commerce would be able to guarantee that these five NEXRAD facilities would be able to accurately forecast weather in the Redding area given this region's great distance from these facilities and its severe weather patterns.

It is my hope that the NWS will change its position and give this community the NEXRAD facility it so desperately needs. With the change in leadership in both houses of Congress coming in the next month, I would also urge you to extend the comment period beyond the January 3 deadline so that the new leadership can have adequate time to review the current plan.

Thank you for your consideration of this matter. I look forward to hearing from you at your earliest opportunity.

Sincerely,

Wally

WALLY HERGER
Member of Congress

WH/bb

CONGRESSMAN HERGER'S SCHEDULE
OCTOBER 20--OCTOBER 22

FRIDAY, OCTOBER 20

1:45PM	CONGRESSMAN AND DAVE TENNY ARRIVE REDDING AIRPORT/DAVE MEURER WILL PICK UP CONGR. AND DAVE AND PROCEED TO REDDING OFFICE.
2:30PM	ARRIVE REDDING OFFICE/AFTERNOON WILL BE SPENT GETTING READY FOR HEARING/GOING OVER NOTES, ETC.
5:00PM	CHECK IN AT THE GRAND MANOR INN/REDDING-221-4472/TWO ROOMS ARE GUARANTEED. ALL CONGRESSMEN AND COMMITTEE STAFFERS ARE STAYING AT THE GRAND MANOR INN.
	DINNER ON YOUR OWN

SATURDAY, OCTOBER 21

8:00AM	STAFF MEETING/BREAKFAST AT MARIE CALENDARS WITH CONGRESSMAN HERGER, DAVE T., DAVE M. FRAN, ETC. GO OVER TODAY'S AGENDA AND ANY CHANGES.
9:00AM	PROCEED TO REDDING DISTRICT OFFICE
11:00AM	CFA/WOMEN IN TIMBER RALLY AT THE CIVIC AUDITORIUM--
	LUNCH ON YOUR OWN
12:30PM	NEED TO BE AT THE CIVIC AUDITORIUM--PRESS AVAILABILITY, ETC.
1:00PM	HEARING BEGINS
5:00-6:00PM	HEARING CONCLUDES
	DAVE M. WILL TAKE CONGRESSMAN HERGER AND DAVE T. BACK TO GRAND MANOR TO UNWIND AND CHANGE INTO CASUAL ATTIRE. HOSPITALITY GATHERING (INFORMAL) WILL BE HOSTED BY CFA AND/OR SIERRA PACIFIC--DETAILS TO FOLLOW).

SUNDAY, OCTOBER 22

CONGRESSMAN AND DAVE T. WILL BE TAKEN TO THE REDDING AIRPORT FOR DEPARTURE TO WDC.

FRAN NEEDS RETURN FLIGHT INFO SINCE TRANSPORTATION WILL NEED TO BE PROVIDED ON SUNDAY MORNING. PLEASE ADVISE.

NOTE: WEATHER IS COOL IN THE MORNINGS AND NICE IN THE PM'S--TYPICAL FALL WEATHER--

HERGER STAFF AND VOLUNTEERS WILL BE ON HAND TO PROVIDE TRANSPORTATION FOR COMMITTEE STAFF AND MEMBERS. A SEPARATE SCHEDULE HAS BEEN PROVIDED.

FRAN WILL NOT BE SCHEDULING REGULAR APPTS. ON FRI/SAT UNLESS ABSOLUTELY NECESSARY. TIME IS NEEDED TO PREPARE FOR SATURDAY'S HEARING--

FRAN WILL BE IN REDDING ON FRIDAY, OCT 20. PLEASE TRY TO REACH HER ON THE MOBILE OR BY LEAVING MESSAGES WITH THE REDDING OFFICE.

The GAO Report

What the Enviros Say the GAO Report Means (FY92-FY94):

• Total receipts from timber sales	$3.0 billion
• Cost of preparing timber sales	- $1.3 billion
• Total distributions to all Forest Service accounts (including payments to states)	- $2.7 billion
• Net loss from timber program	- $1.0 billion

The Truth About the GAO Report:

- It was requested by the ranking minority member of the Interior Appropriations Subcommittee, who has, with the help of national environmentalist groups, tried every conceivable way in recent years to prove that that the Federal timber program loses money.

- The GAO purposefully targeted three years during which timber sales were at a post World Ward II low. Since 1990, Federal timber sales targets have declined by over 60%.

- The GAO report is ***not an accounting report***. It is a report on how the Federal government uses the money it earns from timber sales. ***Environmentalists have purposely used the report as an accounting document to mislead the public.***

- The report shows that, in FY92-FY94, the Forest Service spent $1.3 billion on timber sales and returned $1.7 billion in revenues.

- Even after the Forest Service made all of the allocations from this $1.7 billion required by Congress, ***including $900 million in payments to states to fund schools and roads***, it still returned $300 million to the Treasury.

- The report shows that the timber program is a cash cow for a number of forest service projects, like environmental improvement and recreational roads and trails.

The Truth About Federal Timber Sales:

- Federal timber sales netted $214 million in 1994.
- Since 1989, Federal timber sales have generated $2.8 billion in net revenue.
- Federal timber sales have continued to be profitable despite a 60% reduction in sales since 1990.
- 25% of Federal timber receipts are returned to the states to fund schools and roads. Since 1989, the timber program has returned over _________ to states.
- The accounting method used to calculate profits for Federal timber sales was designed by the Forest Service, the GAO and public accounting firms. It complies with Generally Accepted Accounting Principles.

The Enviros and their Government Counterparts are Trying to Make the Federal Timber Program Unprofitable:

- The listing of the Northern Spotted Owl reduced timber harvesting in Washington, Oregon and northern California by _____%. The bird remains listed despite clear evidence that there are at least 4 times more owls than originally thought and that owls thrive outside of old growth timber stands.
- The California Spotted Owl report has done the same thing to forests in the California Sierran Province. [info on CASPO]
- Environmental groups continue to delay timber sales by filing and threatening to file administrative appeals and law suits. On the Klamath N.F. alone over _____ suits and appeals have been filed during the last ___ years.

- Because enviros threaten suit on salvage sales, the Forest Service puts up sales where the timber is so deteriorated that are not profitable.

- Environmentalist politicians and bureaucrats have increased the amount of inter-agency and consultation that must be completed for each sale. Environmental documents alone in Region 5 cost ______ since 1989. This is _____% of the total costs of preparing the timber sales. The average environmental document for a timber sale is ____ inches thick and takes _____ months to prepare.

-

WH, LEG STAFF, JPM

DRAFT OP-ED PIECE FOR RECORD SEARCH LIGHT. REVISED 10/16/95

It was disturbing to read a recent headline in the Redding Record-Searchlight, which stated "National Forest logging no windfall for taxpayers." Seizing upon a recent Government Accounting Office (GAO) report regarding the cost of the federal timber program, extreme environmental groups have twisted the facts in an attempt to prove that in the past three years the government spent $1 billion more to log national forests than the timber sales netted for the federal treasury.

That charge is flatly wrong. It is simply another attempt by extremist groups to lock up some of the most productive forest land in the nation. It is no coincidence that the GAO report -- which was requested by a strong opponent of timber harvests -- only covered fiscal years 1992 through 1994; a three year period in which timber sales were at their lowest point since World War II.

But even with a declining timber program, the GAO report shows that $1.3 billion in expenses returned $1.7 billion in revenues during this three year period. Environmental groups have rather disingenuously counted only the $300 million that went directly into the general treasury, discounting the money ~~that~~ which was distributed, as mandated by statute, to a variety of federal accounts (such as the National Forest Fund and the Reforestation Fund). In fact, the Forest Service shows a $214 million profit for 1994, which was a very poor harvest year.

Shasta County will suffer if the extreme environmental groups succeed in their disinformation campaign. Shasta County contains some of the best federal timber producing land in the nation. Timber production has been, and always will be, a crucial component of our local economy. In addition to providing good-paying jobs, timber sales directly fund important county operations. By law, 25% of the profits from federal timber sales in Shasta County are returned to the county coffers, to be split evenly between our schools and the upkeep of our roads. **In the past ten years, that pool of funds has totaled $32,865,555 for Shasta County.**

If the timber program is successfully portrayed as a contributor to the national debt, rather than the revenue producing program it has historically been, we could see even further reductions in the already strained county budget. Furthermore, we can expect additional job losses, more dislocation of workers, and increases in the price of timber and therefore the price of homes and other wood-based products.

It has long been a goal of the extreme environmental community to shut down timber harvests. They have utilized a variety of techniques to achieve that end, ranging from the flagrantly illegal and malicious practice of "spiking" (driving metal spikes into trees to render them unmerchantable, with sometimes fatal results to unwitting loggers or mill workers), to campaigns of outright deceit. Despite their tactics **the timber program still makes money, having generated $2.8 billion in net revenue since 1989.**

It is also important to note that counties and states received $900 million in federal timber payments over the past three years. And, according to Forest Service estimates, the jobs generated due to timber sales produced $2.7 billion in associated income, of which $403 million was returned to the treasury in federal income taxes. And this is being accomplished without "destroying" our forests, as is so often argued by extreme environmental groups.

FACT: In 1928, the US Forest Service timber inventory for California was listed as 102.2 billion board feet. In 1992, after 64 years of intensive management and harvesting, California's timber inventory was 185.6 billion board feet. That is an 82 percent increase!

FACT: More than two and a half million acres of California's forests have been permanently set aside for parks, wilderness areas, wildlife habitat, and botanical areas. The logging that does take place in the non-reserve areas is stringently controlled by state and federal laws.

FACT: A well-managed timber program serves a vital role in reducing the loss of forest land due to devastating wildfires. Arguing that a "hands off" approach is "natural" is akin to arguing that we should not take the "unnatural" action of vaccinating our children against early childhood diseases. In both cases, the results can be deadly.

Shasta County, and the nation, needs and deserves a viable, profitable timber program. We cannot afford to let disinformation strengthen the hand of those who, in many cases, would rather see our forests go up in smoke than serve as a renewable, job-producing resource.

4 Pgs

Important!

Previous comments:
From: Jody Cook:R05F11A
Date: Oct 09,95 11:14 AM

Attached are my notes from the trip. Others of you that were there, if I missed anything that you picked up on, please chime in. Most this is from memory... I included some personal observations hoping it'll help the Forest Sups that have similar tours 10/18-20. I don't know what cast of players will be on other tours, may not be a contentious as Plumas was?? Our FS folks did GREAT - very professional, very open and honest with answers. Some things we simply didn't have good answers for. It was really good having all the Forest Sups or Deputies there - showed a real united front from local level. THANKS to all - I personally think it was a success. We won't fix the whole world in one field trip, but I do think we made progress in building bridges, breaking barriers and improving communications. Clearly there's lots of passion from all sides on this issue. Will be interested to hear any feedback y'all hear.
THANKS - Jody

--------------x--------------

Cong, JPM, D.T., D.M. — 10/16 —

I received this E.Mail printout over the weekend from a mole - I'm sure you will find this to be interesting reading -

I need to know if we told Doug Gutharmsen to contact the Plumas on Wally's behalf - I think we may have a problem brewing with this person -

We need to set the record straight - I can do this informally, but I need the facts FIRST!

Fran

Notes from CFA Field Tour - 10/5/95

Prepared by Jody Cook, DFS, Plumas NF

These are cryptic and mostly from memory since I was not in much of a position during the trip to take notes...also includes my personal observations for what worth...

John Hoffman, CFA coordinated a field tour to the Plumas. About 30 people attended: Wally Herger, his aids Fran Peace and Dave Meurer, his lawyer Douglas Guthormsen. Rod Olsen (Tim Leslie's aid), a rep from Bernie Richter's office (didn't get his name), Rose Comstock (CA Women in Tmbr), Frank Stewart (Collins Pine & QLG), Randy Pew (local logger), Sierra CO Supervisor (didn't get name), Jeff Bryant (Independent Forest Prod Assoc), Tad Mason (Pacific Power), Melinda Terry (CFA), Dave Bischel (Pres CFA). Forest Service folks were Leonard Atencio, Diane Henderson, Judy Tartaglia, Jody Cook, Steve Bishop (Sieraville DR, Tahoe), Dave Peters (DR PNF), Frank Ferguson (LMP PNF), Terri Simon-Jackson (RSO PNF), Fred Krueger (TM PNF), John Maupin (FMO PNF), Gary DeBois (Silv, PNF), Bill Wickman (Forester Q/C RD PNF), Bill Hay (RO).

NOTE: Doug Guthormsen used to be a FS employee, he worked on the Plumas, got hurt (OWCP), he quit, went back to college and got an environmental law degree, he works for Herger. His knowledge of the FS is "dated" based on what I heard. Most of his comments were in reference to when he worked for FS back in the late 70's... **My observation is Herger does listen to him tho, so need to pay attention to what Doug says and correct incorrect or "dated" comments.**

John Hoffman opening comments:

* Dave Hessel (WO) encouraged CFA to do these field trips - to interact at local level.

* This is first of 3 planned - others 10/18 and 19.

* Purpose is to learn what we (FS) have to go thru on the ground to put sales up. Learn what they (CFA, Industry, Legislators) need to do to help FS in future.

* There is a concern about finances of sales - they do not want to see Below Cost Timber Sales - we must keep sales in the black.

CFA provided handouts: Chart of SALVAGE volumes for Plumas from FY92-96 and projected FY97. Also had R5 Briefing Paper on "Salvage Barrier Action Plan", July 19, 1995 letter from RF to Forest Sups regarding Adaptive Mngt Plans and BEs, July 23, 1995 letter from RF to Forest Sups regarding Eastside Pine Areas and Spotted Owls, list of Highlights from Interagency MOU.

We met for almost an hour in the SO conference room (it seemed like 10 hours!) then went to field for rest of day. Conf room discussion got pretty intense. Herger did grandstanding - audience was right for it. His comments were loud and empassioned... He expressed major "disgust" (his word) with the volume figures shown for the Plumas, they are too low. He made strong statements to me like "if you can't do the job out here then we'll get someone in here who can". And so on. Questions centered around how much mortality do we have on the Forest, and why aren't our volume figures higher, and are we maximizing opportunity for green thin thru salvage bill.

NOTE: My suggestion for next trips are avoid a conf room discussion - just get everyone out to the field. I think that will lessen the likelihood of a major "chewing out". It's a time and energy sink... I think John Hoffman and Dave Bischel picked up on this too, so they may also try to avoid repeating that setting. Best answer I can think of if this does happen is to simply acknowledge and appreciate the Congressman's passion for the issue, and agree that the program level is nothing near what it needs to be to do the job. Put in context of how much of the Forest is in danger of catostrophic fire and agree there isn't enough money in the govt to "fix" that. But here's what we are doing/can do with what we have.... some hindsight for what worth.

Also think it's a good move for Lynn/Jim/Gil/Jean to NOT be there. If we'd have had that level here I don't think we'd have ever gotten off the political high horse.

We spent rest of day visiting a few sites on Forest. Here's the messages I took home with me - STRONG messages that were repeated over and over:

* Focus on what we CAN do, not what we CAN'T do.
* **FUNDS ARE THERE TO DO IT** - Legislators interpret the law that money is not a barrier, we can use all the SSF we need to do the job.
* **CONTRACTING** - We say workforce is limiting, legislators say "well then contract for more help with SSF"
* **ECONOMICAL SALES** - Sales must be in the black. The cost to put them up (whether we do it inhouse or contract) MUST stay below the value of the timber. According to Herger, there is a strong movement afoot from radical enviros to do away with FS. They are gaining momentum in DC. The main stronghold that's keeping the FS alive is that supporters can show the FS does make money, we return reciepts to treasury. Herger says our opposition would love nothing more than to see the FS go deficit in the salvage initiative, that would be the last straw for the agency, legislation to do away with FS will most likely pass. STAY ABOVE COST!!
* **FLEXIBILITY** - Legislators put much weight in last paragraph of MOU - they interpret it that MOU is only good to the point that it does not override law, the salvage bill is law, therefore it takes precident. Failure to follow MOU is not punishable. **NOTE:** Avoid this discussion if possible, it will only get you the lecture about who does the FS work for, legislators feel we work for them.

The group (especially Herger) was interested in what we are doing different as a result of the salvage bill. He asked the Forests and Bill Hay very pointed questions. Our responses:

* Using Designation by Description
* Using Contract Scaling
* MAXIMIZING ACRES TREATED is what our focus is, not chasing volume. We need to do the total job, intent of the law is to reduce fire hazard, if we just chase volume we may not meet that intent.
* We said for the Plumas the volume assigned is what we can accomplish with our existing workforce. I was asked if we have the understanding that it's OK for us to exceed the target assigned. I said yes, we know it's ok to exceed. Our ability to exceed that target is commensurate with our success at contracting for services and additional skills. We will be looking at contracting for things we have traditionally done in-house. That will be a cultural change for our workforce and we'll have to work thru that, getting folks to let go and do things different.
* We discussed the Adaptive Management Plan the Tahoe/Plumas/Lassen are working on - fast tract - to be done mid Nov - will set us up well for streamlining

projects at end of FY96 and 97. Herger had a hard time accepting this step was necessary - but I think he eventually did by end of day. We said we feel this IS a very streamlined process, it IS different from what we've been doing and DOES meet intent of law - law did not give us license to ignore NEPA obligations.

* 8 snags/acre issue - Herger's lawyer asked where is it in law that we have to leave 8/acre - he interprets the S&G's that we have flexibility, that we're beeing far to literal in our interpretation. We said we'll be adressing that issue in the adaptive mngt plan - assessing the "recruitment factor" for snags. This answer did not satisfy much - expect this issue to come up again on other trips!! They feel we need OGC to give us an opinion that it's OK to not take S&G's literally.
* Range - we're shifting our focus because of direction in the bill.
* SSF - how we utilize the funds and account for them, what is counted as "costs". Ideas were shared for how the system can be changed to bring a higher return back to the SSF pot and more accurately reflect true costs.

NOTE: There seems to be two issues, both causing major frustration for Cong:
1) The magnitude of the total program - legislators do not think volume figures are big enough - frustrated that numbers changed and got smaller. Why?
2) The processes we're using - is the FS really meeting intent of law by CHANGING, REDUCING, ELIMINATING process.
If you can keep those two issues separated in discussion I think it would help. We found they kept getting tangled - everytime we described a step or action we were taking to get contracts out, Herger got concerned it was unnecessary, slowing us down, preventing us from getting more volume. In a side conversation with Herger, I suggested to him that we put the frustration of the magnitude of the program aside - that's a separate issue and needs to play out in a different arena. Suggested we focus on understanding the process issues, cuz regardless of the size of the program, we still need to go thru the same steps. That seemed to help.

SUMMARY: Herger closed saying he wants to help, he wants to see us succeed, he wants to see the FS survive, we need to tell him what we need. He says he will sending us questions in writing to respond to.

FOLLOWUP: Got a phone call from Doug Guthormsen the next day. Said Herger asked him to call. He said thanks for the trip, don't take anything said personally, certain things needed to be said politically, ect. I replied with we all have to do what we gotta do.....that I felt we ended where we needed to, overall day was positive, WE learned a lot, it was insightful to spend time with the congressman hearing and understanding what is behind the law and the politics that are playing thru all this. (I really believe this by the way and had a chance to say this to Herger at end of field trip. Herger agreed - said he felt good about where we ended).
Doug then said he is assigned the task of developing a followup report for Herger and other congressmen (??) listing the more specific things that need to be changed, reduced or eliminated in process to help the FS accomplish salvage initiative. Said he'd be working with CFA to develop a list based on the field trips, what they see and hear. Said they'd be running that list back thru us at Forest, asking us to varify. He does not want to put us in bad position. I told Doug if they have questions, we will answer them, that's our job. Herger wants to utilize CFA as a facilitator, recognizing we can work direct with CFA.

** STAY TUNED **

Mr. ROHRABACHER. Thank you very much, Mr. Herger.

Having had several meetings with you about this even before I was Chairman of this Subcommittee, I realize what a high priority you are placing on Weather Service and forecasting for your area, and how important it is to your local economy and the local safety of your people.

So we have been working on this together for a number of years, and I appreciate your ongoing concern, as well as your personal involvement in helping us develop the system that is going to work for the whole country as well as for your own area.

So, thank you very much, Mr. Herger.

Mr. HERGER. Thank you, Mr. Chairman.

Mr. ROHRABACHER. Mr. Souder?

STATEMENT OF THE HONORABLE MARK E. SOUDER, A REPRESENTATIVE IN THE CONGRESS OF THE UNITED STATES FROM THE 4TH DISTRICT OF INDIANA

Mr. SOUDER. Thank you, Mr. Chairman.

I also want to praise your efforts toward modernization. The meteorologists in our area are not opposed to the modernization; we just want to make sure we are covered in our area.

I hope you will fight in conference to hold our amendment, because I also understand the budget constraints and to fix the different problems may take a number of years. If we can be supplementally protected at least until we make the transition, I hope that can occur.

Mr. ROHRABACHER. Just to make a comparison, when we are developing new aircraft whether it is the C-17, or whether it is the 747, or the 707, the aerospace industry always has glitches in whatever airplane, new airplane, new technologies they have come out with.

What is important is to make sure those glitches are taken care of so that the safety and efficiency of the aircraft is ensured, but it does not mean scrapping the whole new aircraft; because every aircraft that is put in place has to be perfected. That is the way I look at this new weather modernization program.

It is going to have some glitches. Let's make sure it is working properly so that our people can get the benefit of new technology.

Mr. Souder, go ahead.

Mr. SOUDER. Thank you very much.

We had 120,000 people in my District send in cards to NOAA concerned about the Weather Service because of our history of tornados.

In Indiana we have the second highest rate of tornado-related deaths in the country, and we are fifth in tornado frequency. So tornados are a big fear to many residents even beyond the amount of frequency because it is unknown and you never know when you are going to get hit. It is a great fear.

We have them erupt quickly and violently in small cells at low levels. Fort Wayne, Indiana, is the number one site in the country for these types of thunderstorm or "microburst" or "straight line" winds which can travel at speeds of 125 miles an hour.

Microburst winds extend over an area of less than two miles and last for only a few minutes. We have a responsibility to ensure that our citizens have all possible warning in the event of violent weather. We cannot do so with the current configuration.

Both the Weather Service and the National Research Council now recognize that the current NEXRAD system cannot adequately cover these violent and potentially dangerous storms, because the planned NEXRAD sites are too far from Northeast Indiana and Northwest Ohio to provide effective service.

They acknowledge that, especially for these small-scale storms, that their ability to forecast deteriorates significantly at 80 to 90 miles as opposed to the previous 150.

But even this estimate overstates the effective range for Northeast Indiana because the NRC based it on the range for "F3-F5" tornados with large vortices. The tornados prevalent in Northern Indiana are the smaller vortices "F0-F2" tornadoes which are much harder to detect and occur quickly, the microbursts that I referred to earlier. They occur also at altitudes of less than 10,000 feet. Yet, the radar from the Indianapolis NEXRAD station passed over at 13,000 feet. So they are below the detection level of Indianapolis.

Dr. Peter Ray, one of the leading experts on NEXRAD placement, has informed my weather advisory committee, which I have through our Office of Emergency Management Services, all the meteorologists and weather forecasters in our area, that 50 miles may be too far in light of the history of small tornados and microburst wind damage in our particular region.

Yet, the implementation plan would attempt to protect the northern half of my District from sites more than 120 miles away in Grand Rapids and Detroit; the southern half of my District from sites more than 120 miles away from Indianapolis and Cincinnati. We have four different ones coming into our District and area. Emergency units face the virtually impossible task of coordinating information from all four of these sites simultaneously.

In my Floor statement I made a reference to a small tornado that came up when I was near the Ohio line during my campaign and literally had we had to relay it back through three different stations, I was herded quickly into a bomb shelter because by being able to relay it into Fort Wayne and out to Woodburn, the tornado only had to go four miles and it would not have been possible under the current proposed configuration.

These facts clearly indicate that the additional NEXRAD sites are necessary for areas that are at significant risk in Northern Indiana. I want to make it clear that Mr. Buyer or Mr. Roemer and I, our number one concern is to make sure that our residents are covered, not where it is.

But I want to make a pitch for where I think it should be:

I have a concern. My wife is from South Bend. I went to Notre Dame and put up with the snow effect numerous years and moved out, but I want to say that the primary purpose of NEXRAD is to detect tornados and severe weather, not lake effect snows.

I also believe that, while South Bend does have a tremendous problem with snow, which is hurting our football recruiting, at the same time it is closer to other sites than we are in northeast Indiana, and particularly in northwest Ohio.

Secondly, we have a similar thing with Grissom Air Force Base, which is closer to—former Grissom Air Force Base—which is closer to Indianapolis and would not really adequately cover. While it might do a fair job in my western half of the District, Congressman Gillmor's, part of his district, and there is one county in Congressman Buyer's and several in McIntosh's that would not be reached by Grissom because they would be beyond that.

Therefore, generally speaking it would seem that the logical site would be somewhere in northeast Indiana because you could cover back towards the Warsaw-Grissom area, and up towards Saint Joe County, but also cover not only my District but it is why Congressman McIntosh, and Gillmor, and Buyer also support the Fort Wayne site, because we could reach into Ohio, which has a lot of rural counties that are also in this gap zone.

I commend you once again and look forward to working with you. I do not have a strong opinion as to the proposal that came up on the more cost-efficient way to do it. As you know, I am very concerned about the budget, too.

This Committee I know is concerned about that, and protection for citizens.

Thank you for this hearing. Thank you for your cooperation on the Floor the other day, and I am looking forward to working with you.

[The prepared statement of Mr. Souder follows:]

Statement of Rep. Mark Souder

Next Generation Weather Radar (NEXRAD): Are We Covered?
Subcommittee on Energy and Environment
Committee on Science
October 17, 1995

Mr. Chairman, I would like to commend you for your leadership in holding this hearing and for your continued attention and sensitivity to the needs of regions facing degradation of service under the National Weather Service's national implementation plan. On behalf of the many Northeast Indiana residents and others concerned about the adequacy of coverage under the NEXRAD system, I am here to urge the committee to ensure that the Weather Service revises its plan to reconcile it with the National Research Council's conclusion that some areas, including Northeast Indiana, are at risk of degraded service.

Over 120,000 residents of Northeast Indiana and Northwest Ohio have petitioned the National Weather Service to maintain effective radar coverage and storm warnings for our region. They are rightly worried because Indiana suffers the second highest rate of tornado-related deaths in the country, and is fifth in tornado frequency. These storms erupt quickly and violently in small cells at low levels. Fort Wayne, Indiana is the number one site in the country for these types of thunderstorm or "microburst" or "straight line" winds, which can travel at speeds of 125 miles per hour. Microburst winds extend over an area of less than two miles and last for only a few minutes. We have a responsibility to ensure that our citizens have all possible warning in the event of violent weather. It is apparent that we cannot do so with the configuration currently outlined in the modernization plan.

Both the Weather Service and the National Research Council now recognize that the current NEXRAD system cannot adequately cover these violent and potentially dangerous storms because the planned NEXRAD sites are too far from Northeast Indiana and Northwest Ohio to provide effective service. Weather Service officials acknowledge that NEXRAD forecasting capabilities, especially for small scale systems, will deteriorate significantly 80 to 90 miles from the radar location. But even this estimate overstates the effective range for Northeast Indiana, because the NRC based it on the range for "F3-F5" tornados with large vortices. The tornados prevalent in Northern Indiana are smaller vortice "F0-F2" tornados that are harder to detect.

Microburst winds occur at altitudes of less than 10,000 feet, and yet the radar from the Indianapolis NEXRAD station passes over at 13,000 feet.

Dr. Peter Ray, one of the leading experts on NEXRAD placement, has informed my weather advisory committee that a distance of even 50 miles from the radar site may be too far in light of the history of small tornadoes and microburst wind damage in the region. And yet the implementation plan would attempt to protect the northern half of my district from sites more than 120 miles away in Grand Rapids and Detroit, Michigan, and the southern half of my district from sites more than 120 miles away in Indianapolis and Cincinnati. Emergency units face the virtually impossible task of coordinating information from all four of these sites instantaneously.

Mr. Chairman, these facts clearly indicate that additional NEXRAD units are necessary for areas that are at significant risk under the current implementation plan, including Northern Indiana. The scientific facts further suggest that the optimum placement for a new site is in Northeast Indiana for several reasons. First, Dr. Ray has expressed his opinion that there is no scientific evidence in favor of a site in

Northcentral Indiana. The South Bend area is within the range of the existing NEXRAD site in Chicago. The only argument in favor of a site in the South Bend area is that it would help detect lake effect snows, but NEXRAD is primarily designed to detect tornados and severe weather and not lake effect snows. Basic meteorology textbooks recognize that regions subject to lake effect snows also have less severe and life-threatening weather phenomena of the type seen in Northeast Indiana.

Second, I do not believe that either Northeast Indiana or Northwest Ohio would be served by placement of a new NEXRAD unit in the area of Grissom Air Force Base. My advisory panel has noted that the Department of Defense does not continuously man its radar stations nor does it have a consistent track record of disseminating weather data to civilian networks even though instant warning is crucial for severe storms. The Grissom site was originally considered only because the Department of Defense would have provided partial funding for a NEXRAD, which is no longer an option in light of the recommendations of the base closure commission. Moreover, the Grissom area is well within the range of the NEXRAD in Indianapolis.

Finally, placement of a new site in Northcentral Indiana would ignore the early warning needs of residents in both Northeast Indiana and Northwest Ohio. The only benefit would be redundant coverage and snow warnings for an area already protected by the existing NEXRAD network. That insurance cannot be justified at the expense of basic early warning services for the many citizens who now rely on the superior coverage offered by the current system and who will be at risk without further action.

Mr. Chairman, I look forward to continuing to work with you on this important issue and urge you to take effective steps to ensure adequate protection for our citizens.

Mr. ROHRABACHER. Thank you very much. I know you will be participating in the meetings with Members of Congress and the National Weather Service about determining exactly where those locations are.

I do not think we can do anything about how much snow you get, but we can probably determine when you are going to get it.

Mr. ROEMER. Mr. Chairman?

Mr. ROHRABACHER. Yes.

Mr. ROEMER. Could I just say that, after hearing the gentleman from Indiana's testimony, that I will have to pass on to Coach Holtz at Notre Dame that the gentleman wants to hurt his recruiting efforts by moving that NEXRAD radar further away from Notre Dame.

We want to make sure you come in for the USC/Notre Dame game this weekend and root the Irish on to victory.

Mr. ROHRABACHER. Well said.

Mr. Thornberry?

STATEMENT OF THE HONORABLE WILLIAM M. "MAC" THORNBERRY, A REPRESENTATIVE IN THE CONGRESS OF THE UNITED STATES FROM THE 13TH DISTRICT OF THE STATE OF TEXAS

Mr. THORNBERRY. Thank you, Mr. Chairman.

I too want to join in thanking you and the Full Committee Chairman for your work in trying to solve the problems of modernization and to plug these holes.

I also appreciate both of your support of my amendment on the Floor last week.

I think if we could make that happen—in other words, made the DoD radars come up to the same standards as the National Weather Service radars, it would plug a big hole.

I certainly agree with my colleagues.

These are questions of life and death.

Warnings are absolutely essential.

I also believe that we have basically two kinds of problems. Some are technical—and I want to talk more about those with the DoD radars—but there is also a perception problem.

All of us need to be aware of that.

What we need to try to do is increase confidence in our population as this modernization proceeds, because they need to feel safe and secure as we make this change. That is part of what we need to do, as well.

As you know, Mr. Chairman, my primary problem in my area has to do with the Department of Defense-run radar.

As identified in the NRC report, there are about 15 of these around the country that are a part of the network to cover people but are not run by the National Weather Service; they are run by the Department of Defense.

There is an Interagency Agreement that sets up the standards for how these radar are to be run, but that agreement is not being kept.

So that if you look at all the radar around the country, those that are available the least percentage of the time are the DOD radar.

They do not have to meet the same standards of communication lines and other things.

As a result, they are, at least in my area, unreliable. This is not a hypothetical situation for us as to what can happen.

As a matter of fact, on May 27th, 1995, a tornado touched down in a town in my District, Vernon, Texas.

The primary radar, which is only about 30 miles away, a DoD radar, was out of commission.

The backup radar, which is more like 150 miles away, a DoD radar, was out of commission and there was no radar covering these folks.

So that the tornado comes down, goes through town; eyewitness reports call in the National Weather Service radar in Norman, Oklahoma, which is about 200 miles away. Based on these eyewitness accounts, they put out a tornado warning about 15 minutes after the tornado goes through town.

Unless these radar are reliable, we have got real trouble.

In early August I called everybody together in one room at the Air Force Base over in Oklahoma to talk about exactly what was causing our problems.

We had local Air Force folks, we had people from the Department of Defense, we had National Weather Service, we had the phone line people, the local phone line people, the long distance people.

I wanted everybody together to find out what the problem was.

We came up with three primary problems that I think have got to be addressed, at least in this case.

Number one is the phone lines.

This is a radar that is about 40 miles away from the base that controls it, and at least 120 miles away from the National Weather Service station.

So that what happens is, the wind blows in a storm and the phone lines go down. The radar is knocked out. That has happened with alarming frequency.

In addition, there can be enough static develop on the phone lines that the static alone knocks the radar out.

That has happened time and time again over the course of the spring.

If the phone lines are knocked out, the signal cannot go from the radar to the National Weather Service office.

It cannot go to the computer which controls the radar, and so the whole system is wiped out only because of the phone lines.

Now the phone company is planning on changing to fiber optics at some point, but we do not know when that is going to happen.

At least until that happens, we are going to have a reliability problem.

Secondly, they identified that the power source is a problem. The same winds that knock the phone lines out knock the power lines down. Lightening strikes have knocked the radar out.

There is no backup power system. They would like to see an uninterruptible power source installed at these radar so that there is a backup.

But obviously when you tend to have lightening is in the middle of a storm, and if your radar goes out in the middle of a storm it is not doing you much good.

And that is what happens in our area.

Thirdly, it may be a particular problem but the configuration of the radar is such that it takes at least an hour to get back up once it goes down.

That is, by people going from the Air Force Base, taking a helicopter out there by the fastest means possible. Obviously that is far too long.

These are specific technical problems that make this radar unreliable and results in my constituents not having confidence.

Let me just point out a couple of other things that were identified.

Earlier this year there was a real problem in getting spare parts for the DOD radar.

It was much slower than the National Weather Service radar. They seem to have improved on that.

But there is also a real concern in my area about the size of some of these areas that are going to be reporting to some of the National Weather Service forecasting offices. Outside of some of the big areas in the West that do not generally have a problem with tornados, the Norman, Oklahoma office has the biggest square miles of any area in the country, about 50,000 square miles, that they are responsible for.

Meteorologists in my area are concerned that if you get busy watching a big storm up north of Oklahoma City, you forget about watching for the little ones that are down, say on the Texas border.

I think that is something that the Committee ought to look at.

How big an area do we concentrate into one office? What is the human capability for paying attention to all that information that is coming in?

The last thing I want to mention is the importance of communications.

It is one of the recommendations of the National Research Council that the National Weather Service has got to ensure the maintenance, operation, and communication with the NEXRADs.

If you could do that and make all of the DOD-operated radars operate at the same standards as the National Weather Service radar, you will go 90 percent of the way toward solving the problems in our area.

And until you do that, we do not have any radar coverage in what is probably number one or two in the country as far as tornado frequency.

I appreciate your efforts. It is essential that we get it done.

[The prepared statement of Mr. Thornberry follows:]

NEWS FROM
CONGRESSMAN MAC THORNBERRY
13th Congressional District of Texas
1535 Longworth House Office Building, Washington, D.C. 20515 (202) 225-3706 Fax (202) 225-3486

STATEMENT OF U.S. REP. MAC THORNBERRY
BEFORE THE
COMMITTEE ON SCIENCE'S
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

October 17, 1995

The Need for Weather Radar Modernization

Mr. Chairman and Members of the Committee:

Thank you for giving me and others the opportunity to discuss modernization of the National Weather Service and some of the problems which must be addressed to complete it.

As the recent rash of hurricanes have shown, we have come a long way in our ability to track and monitor storms. Indeed, the ability of modern radar to detect a storm more than a thousand miles off coast and track its movement inland to within a few miles is truly amazing. But for thousands of people in my district and hundreds of thousands more across the country, this miracle of modern technology has yet to fully arrive.

In North Texas, severe thunderstorms and deadly tornadoes have become a way of life each spring and early summer. In 1979, Wichita Falls -- the largest city in my district -- was devastated by a tornado that killed 59 and injured more than 2,400. More recently, this past year part of my district was hit by more tornadoes than ever before. Tragically, some of these struck without warning.

When a tornado hit the town of Vernon in May, for instance, the town's residents were caught completely off guard. The radar was down. In fact, all of the radars that were supposed to cover the region were down. When a warning was finally issued, it was not based on data collected through modern technology -- it was based on information supplied by eyewitness accounts! Fortunately, this particular storm did only minor damage, but the fact that the people were vulnerable is a situation that -- if it continues -- is totally unacceptable.

Timely warnings, along with adequate coverage and reliable communication, are the three essential elements of any reliable and fully functioning weather radar system. If any of these elements breaks down, property can be destroyed and lives can be lost. So what are our options for correcting the problems which currently plague our system?

Several of the studies which have been made on modernization have identified a number of areas around the country which rely on radar coverage from NEXRAD radars run by the Department of Defense. These radar have been viewed as "supplementary" or "back-up" to the National Weather Service radars. Unfortunately, these "back-ups" are all there is to protect people in many areas. There is an agreement among the relevant government agencies as to how these radar will be run and what standards they must meet, but this agreement is not being kept.

--more--

724 South Polk, Suite 400

Last week my amendment to the NOAA reauthorization bill required that DOD radar meet the same standards of quality and availability as the NWS radar. If that happens, many of our problems will be solved. I greatly appreciate the support of you, Mr. Chairman, and the other Members of the Committee in passing this amendment.

I believe one of the essential functions of the federal government is to help provide severe weather warnings. Modern technology allows us to do a better job than we have ever done before. I strongly support your efforts to make sure that everyone, particularly in areas prone to severe weather, is covered by the best, most accurate, most reliable radar technology developed. But it has to be reliable -- it has to be there when you need it

I know that a number of Members have concerns with closing down existing Weather Service offices. I have concerns about shutting ours down too if there is nothing reliable to take its place It's kind of like having a 1965 car in the garage along with a 1990's model that only works part of the time. The 1965 car is better than walking, but you don't want to give it up until you're sure you can count on the new car to get the job done. But you also don't want to settle for the 1965 version when better models are available. My constituents deserve to have the best, most complete protection that modern technology can provide And I, for one, am not going to rest until they get it.

Earlier this year, I asked all of the relevant entities involved in providing coverage for North Texas to get together to discuss exactly what the problems were. There were representatives from the Air Force, from the National Weather Service, from the local telephone company which owned the lines, and from the long distance carrier. When all was said and done, three main problems emerged:

- The phone lines went out, particularly during bad weather. These lines carry the radar signal back to the base where the radar operators are and to the National Weather Service office Sometimes the lines go out when there is too much noise on the line. When the phone lines go down, the radar shuts down. While the phone company plans to move to fiber optic lines, there are no guarantees as to when this will occur.

- Because power is sometimes knocked out during lightning storms and a back-up power system does not exit, the entire radar can shut down without warning.

- Because the computer and the radar are about 40 minutes away from the Air Force base, when it does go down, it takes at least a hour to get it running again and sometimes that can be too late.

A recent report by the National Research Council made several recommendations that could help address some of these problems. Among other things, the report stated that we must "take immediate steps to ensure that the 15 NEXRADs under the control of the Department of Defense ... function as fully committed elements of the national weather radar network, operating with the same standards, quality, and availability as the National Weather Service-operated NEXRADs."

There are currently no guarantees that these recommendations will be enacted into law and that these problems will be fixed Until this occurs, my constituents and thousands of other people across the country will not have reliable coverage of weather radar, and will continue to be threatened by the deadly storms which plague our region each year.

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Mr. ROHRABACHER. Mr. Thornberry, I would like to thank you very much for your activism.

You have already been active on this issue and have presented legislation on the Floor which, as Chairman of this Subcommittee, I supported.

Your concerns about the efficiency of the radar in the military when it is being put to civilian use is very well founded. This, along with the other glitches—you might say—in the modernization of our program, are being looked at.

I do look forward to working with you and the staff, my staff, and I will be working with you in the future to try to correct some of the problems that you have talked about and make sure that people are protected.

I remember one of the most terrifying nights I ever had was when I was a young boy and I visited some relatives in North Dakota. There was a tornado warning, and we had to open up this—it was out on the farm, and it was at night, and we had to open up the trap door and crawl down into the cellar and spend the night in the cellar.

It was like a dirt cellar, too; it isn't like the cellars—my relatives were not very well off, so they just had jars of pickles and things down there. But I remember we had no idea whether or not a tornado was going to come through out of the darkness and destroy that house.

So I understand, and I am sure a lot of people here understand just the vital significance of what all of you are telling us about today in terms of the life and health and safety of our constituents.

I see that the distinguished Chairman, Mr. Walker, has been in and out. When he comes back, we will ask him if he has an opening statement.

Mrs. Cubin, would you like to say a few words?

Mrs. CUBIN. Thank you, Mr. Chairman.

I do want to thank you for holding this hearing today, and certainly thank my colleagues for coming to testify. I was particularly interested in Representative Thornberry's letterhead.

I just wondered if he was campaigning for anything?

Mr. THORNBERRY. No.

Mrs. CUBIN. Anyway, the issues that we will address of weather forecasting and safety are of particular importance to my State of Wyoming.

Weather patterns can be very volatile in Wyoming, which is a State with lots of mountains and planes and of varied landscape and expansive geographical area.

Wyoming is to be the home of two NEXRAD sites on completion of the National Weather Service modernization. The NEXRAD in Cheyenne is currently operational, and the site in Riverton will be up and running soon.

Given that modernization process, including the placement of NEXRAD sites in Wyoming, also means the consolidation and closure of some existing Weather Service facilities.

I am keenly interested in examining the quality of service that modernization will provide. I do have some concerns about the fact that there will be areas where we will not have any people on site for weather forecasting and to announce emergencies that are going on.

Also on a somewhat related matter, I have some serious concerns about the way in which the Department of Commerce has been, to my mind anyway, making overly broad and misleading claims as to the effect on the National Weather Service of House plans to dismantle the Department of Commerce. But I do look forward to today's testimony, and I look forward to hearing from Dr. Friday on the Weather Service. These are very important issues.

Thank you, Mr. Chairman. And thank you.

[The prepared statement of Mrs. Cubin follows:]

STATEMENT OF U.S. REPRESENTATIVE BARBARA CUBIN

Before The Energy and Environment Subcommittee
House Committee on Science
17 October 1995

"The Next Generation Weather Radar (NEXRAD): Are We Covered?"

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Mr. Chairman, I want thank you for holding this hearing today.

The issues we will address of weather forecasting and public safety are of particular importance to my state of Wyoming.

Weather patterns can be very volatile in Wyoming, a state in which a varied landscape of mountains and plains are encompassed in an expansive geographical area.

Wyoming is to be the home of two NEXRAD sites on completion of National Weather Service modernization. The NEXRAD in Cheyenne is currently operational and the NEXRAD site in Riverton is to be up and running soon.

Given that the modernization process, including the placement of the NEXRAD sites in Wyoming, also means the consolidation and closure of some existing weather service facilities, I am keenly interested in examining the quality of service that modernization will provide.

Also, on a somewhat related matter, I have some serious concerns about the way in which the Department of Commerce has been, to my mind, making overly broad and misleading claims as to the effect on the National Weather Service of House plans to dismantle the Commerce Department.

I look forward to hearing today's testimony -- especially from Dr. Friday of the National Weather Service -- on these important issues.

Mr. ROHRABACHER. I appreciate your comments.

Ms. Rivers I guess just left, so I am sorry—Do we have any questions of the panelists?

[No response.]

Mr. ROHRABACHER. You have a couple of Members here. I think, Mr. Thornberry, we are all running for something.

[Laughter.]

Mr. ROHRABACHER. Those of us who are not running for something are running from something. So I appreciate your testimony, and we will ask the second panel to take their seats.

Thank you, very much.

We will now hear from our panel. Dr. Joe Friday is the Director of the National Weather Service.

Mr. William Gordon who is the Chairman of NEXRAD for the National Research Council is with us today and will answer questions.

However, understand that Mr. Gordon is recuperating from a recent illness and that Floyd—is it Hath? Hauth? Hauth—will read his opening statement.

Mr. Hauth is the Study Director for the National Weather Service Committee on Modernization.

Jack Brock, Jr., is the GAO's Director of Defense Information and Financial Management Systems.

So first of all, Mr. Friday, we will start with you. Welcome back. We are pleased to see that great looking beard you have got.

STATEMENT OF ELBERT W. "JOE" FRIDAY, DIRECTOR, NATIONAL WEATHER SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D.C.

Dr. Friday. Well, it is a different color than yours, sir, but I think I have earned every one of these white hairs as a result of this modernization process that we are going through.

Mr. ROHRABACHER. You just do not use the proper technology.

[Laughter.]

Dr. Friday. I think I will let that one pass.

[Laughter.]

Dr. Friday. Sir, with your permission I would like to have my testimony, my written testimony, entered into the record.

Mr. ROHRABACHER. Without objection.

Dr. Friday. Then I would like to briefly summarize the testimony for discussion today so that we may leave more time open for the questions that will be discussed.

The modernization of the Weather Service is probably the most ambitious undertaking that the Weather Service's Weather Bureau has done in its 125-year history.

I listened very carefully to the Floor debate last Friday, last week, I think it was Friday, on the Cramer Amendment. I really appreciate all of the confidence placed in the National Weather Service and the importance of this organization to the American Public.

I agree with that assessment. I did notice that I received a new nameplate for my desk, however, after the Floor debate was over in which it said "Dr. Joe Friday, Some Government Bureaucrat."

So, other than that, it was a very enlightening and informative Floor debate. Again, I repeat, I certainly appreciate the support for the National Weather Service by you, Mr. Chairman, and the Members of your Committee, and the Members that spoke on the Floor as far as what we are trying to do not only on our day-to-day activities but also in the modernization program.

The modernization program is well along. We have installed now almost 130 of the Next Generation Radars across the country of a total of 163 that will be in the final network, including those that will be used in training and maintenance training.

We are experiencing very good success with those. I think that everyone agrees that this is a tremendous capability.

I appreciate your statement, Mr. Chairman, about the fact that, as with any major modernization effort, or major developmental effort, there are always things to be learned and mid-course corrections to be made.

The fact is that we have learned that we need to improve certain aspects of our various programs. I was delighted to hear Mr. Thornberry point out the fact that he visualizes and he interprets, from his own experience out there, that the maintenance system, for example, for radars which we have been working on with DoD and with our own activities are improving.

We are also recognizing the other deficiencies that have been identified by the GAO and by others, and we are continuing to work to improve those.

But, considering that the first one of these radars only began operating in the early Spring of 1991, I feel we have made remarkable progress. As we have seen these systems introduced across the country, we have seen significant improvements in the accuracy of our thunderstorm warnings, and the accuracy of our severe-weather warnings, and tornado warnings, and the like.

We have been able to track very carefully the storms as they develop and evolve and, although Mr. Thornberry pointed out a warning that was 15 minutes late in his testimony before the Committee here, I would point out that a few years ago the average lead time of all of the weather warnings in the National Weather Service was a negative number.

The fact is that, when we began this modernization process the average lead time for all severe thunderstorm warnings, all tornado warnings, was minus two minutes. We basically said what you just saw was a thunderstorm, or what you just saw was a tornado.

But the fact is that now where we have the new system installed, collectively—all taken together—we are experiencing lead times on the average of around 15 minutes. So that is the type of new capabilities that we are bringing.

Now I want to point out one thing because I heard several cases of particular failures under a certain individual weather event today.

That will occur, and that will continue to occur based on all of our information that we have to date, in the middle of Norman, Oklahoma, where we have the most experience, where we began with operating the first radar and where we had 10 years of experience with the best scientists in the world on severe weather, we still hit only 85 to 90 percent of the severe storm events.

Mother Nature still has some surprises for us, and she will continue to have surprises for us, I predict, and I try not to predict too many things, but I predict that she will still have surprises for us for many years to come.

One of the things we are trying to do in the rest of the NOAA programs dealing with the research is to address these particular issues, to understand on the research side more about the development and evolution of storms so that we can reduce that error that we still have, even in the best of all possible configurations.

I think it is very important that we understand that we must work through the communities, and with the local population to ensure that they know and they understand what our capabilities are, and also what our limitations are.

It is very important to understand that so that the public can react in the best possible fashion, not only when we are able to provide a weather warning, but in those situations in which we are not able to provide a weather warning for one reason or another.

Mr. Chairman, as I indicated, there are times for mid-course reviews and potential mid-course corrections.

What we have underway at the present time is the review by the Secretary of Commerce of the modernization of the Weather Service based upon the agreements that we reached with Members of Congress over a year ago under the very strong encouragement of some Members of your Committee here.

Mr. Cramer is laughing at that. He contributed very forcefully to making sure that we really took a look at this mid-course correction to see if there were changes that were required in this.

The National Research Council, as you will hear from actually Floyd for Bill Gordon here in a few moments, has looked at one aspect of that.

The Secretary is now reviewing that activity and we will be making his recommendations to Congress in November. We do expect that some of the concerns will be answered. Some of the concerns probably will not be answered.

But I believe that this is a solid, technical review of all of the issues that were raised by all of the various Members of the public, all of the various Members of the Congress, as far as what the modernization of the Weather Service program was doing and was capable of doing.

Mr. Chairman, I will not go on any further right now. As I indicated, the status of the modernization program is indicated in my written testimony. I would rather reserve time for any questions and answers at the end of the session.

Thank you, sir.

[The prepared statement of Mr. Friday follows:]

TESTIMONY OF
ELBERT W. FRIDAY, JR.
ASSISTANT ADMINISTRATOR FOR WEATHER SERVICES
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

BEFORE THE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

OCTOBER 17, 1995

Mr. Chairman and Members of the Subcommittee, my name is Elbert W. Friday, Jr., and I am the Assistant Administrator for Weather Services of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. I appreciate the opportunity to testify concerning the modernization and associated restructuring of NOAA's National Weather Service (NWS).

The NWS provides around-the-clock weather forecasts and severe weather warnings, watches, and advisories for the United States and its territories, adjacent waters, and ocean areas for the protection of life and property and the economic well-being of the Nation. NWS provides these services through a national network of 52 Weather Service Forecast Offices, 13 River Forecast Centers (RFC), national guidance centers, and approximately 200 small, localized weather offices. These offices collect data, prepare central forecast guidance and state and local warnings and forecasts, and disseminate information to the population. NWS forecast offices issue specific warnings of severe weather such as hurricanes, tornadoes, severe thunderstorms, flash floods, and extreme winter weather.

The United States continues to experience record-setting weather-related disasters. This past year's onslaught of winter flooding, spring tornadoes and floods, summer floods, and the deadly heat wave, followed by the second most active hurricane season on record, was responsible for over 1,000 lives lost and nearly a dozen federally declared disasters.

In January and March of this year, winter flooding in California resulted in 20 deaths and upwards of $1 billion in damage. Multiple severe weather events in Texas, Louisiana, Mississippi, and Alabama caused over 60 deaths and over $6 billion in damage. In May of this year, widespread river flooding throughout the central plains caused four deaths and nearly $1 billion in damage. In that same month, we suffered over 300 severe weather events including tornadoes, severe thunderstorms, and flash floods resulting in 6 deaths and over 65 injured. June of this year initiated the second most active hurricane season on record. This year's 17 tropical storms in the Atlantic Ocean, 10 of which became hurricanes, were responsible for over 30 deaths and tens of billions of dollars in damage, and the toll is still mounting. The incredible heat wave accompanying this summer's drought in the Northeast caused over 500 deaths in Chicago alone. The resultant drying of vegetation in August sparked wildfires on Long Island. The year, so far, has demonstrated the great diversity and severity of life-threatening weather events this Nation experiences.

Some of the most deadly weather events--such as tornadoes, severe thunderstorms, and flash floods--are also the most difficult to detect and forecast. However, the scientific understanding of hydrometeorological phenomena has increased dramatically over the past two decades. Accurate and timely information about these phenomena is key to mitigating their effects on the lives of our citizens.

Well underway is a large technological modernization and organizational restructuring effort that will apply advances in hydrometeorological science and technology to operational forecasting and replace obsolete and increasingly unreliable equipment. These replacement systems, coupled with observations from advanced geostationary satellites and newly developed mesoscale forecasting techniques, are improving the timeliness and accuracy of severe weather and flood warnings to the U.S. public. The modernization and associated restructuring of the NWS will result in transitioning and streamlining the current weather office structure to 118 Weather Forecast Offices (WFO) and 13 RFCs.

The modernization includes Doppler weather surveillance radars (WSR-88D), also known as Next Generation Weather Radar or NEXRAD; Automated Surface Observing Systems; next generation Geostationary Operational Environmental Satellites; and the acquisition of super computers, all of which will provide forecasters with a wealth of data. These data will be collected, distributed, and integrated by scientists using a new workstation called the Advanced Weather Interactive Processing System at WFOs and RFCs.

I am pleased to report that considerable progress has been made in implementing the new technology. We are already reaping some of the benefits from these changes; however, much remains to be done to ensure that all Americans enjoy these benefits to the fullest potential.

Our strategy is to make the transition in modest, manageable steps in close consultation with all users of our products and services. At the same time, the agency must move as fast as reasonably possible to minimize costs and begin accruing the benefits of a modernized weather service.

FOCUS ON THE WSR-88D

One technological cornerstone of the NWS modernization is the WSR-88D. The WSR-88D excels in detecting the severe weather events that threaten life and property, from early detection of damaging winds to estimating rainfall amounts for use in river and flood forecasting. Most important, the WSR-88D can increase advanced warning time and the specificity of such warnings for short lived, often catastrophic events such as tornados, downbursts, and flash floods.

The national network of 160 WSR-88Ds will provide a significant improvement in uniform areal coverage over the present radar network. NWS plans to operate 118 WSR-88Ds and will have access to data from the Federal Aviation Administration and Department of Defense WSR-88Ds. As of late September, 100 WSR-88Ds have been delivered, of which 77 have been commissioned. The three agencies coordinated geographical placement of the new radars with the goal of providing uniform national coverage by these land-based systems.

The severe weather and wind detection capabilities the WSR-88D offers are contributing greatly toward an increase in the accuracy and timeliness of NWS warnings. Because of the technical limitation of the old radars, tornado warnings were usually issued only when visual sightings had been reported. Utilizing the Doppler radar technology, forecasters can observe the circulation patterns within thunderstorms that favor the formation of severe weather elements, such as tornadoes. The WSR-88D can sense atmospheric motion even in clear air.

It is the identification of these precursor conditions to storm development and monitoring and forecasting of storm movement that permits earlier, more accurate, and site-specific warnings. Detection of the embryonic stages of severe storms and tornadoes is how the WSR-88D enables NWS meteorologists to provide more timely warnings. Properly trained meteorologists operating the WSR-88D are rapidly changing the NWS severe weather warning program from one of observation and tracking to one of prediction and warning with effective lead time.

In addition to issuing highly focused warnings, we are able to reduce "false warnings" to the public. These focused warnings, plus the forecaster's ability to not issue warnings for events that he/she is confident will not become severe, are having the added benefit of increasing the credibility of NWS warnings. The NWS currently operates a good severe weather warning program. However, the WSR-88D is quickly moving that program to an excellent level. The WSR-88D has proven extremely valuable during winter weather events. It has demonstrated superior ability in showing where the rain/snow line is in precipitation. Its greater sensitivity enables precipitation to be detected that was not possible with the old radars.

The WSR-88D also provides detailed quantitative estimates of precipitation over a wide area. This information is vital for improved hydrologic forecasting at all scales and for many purposes. Through improved small basin flash-flood warnings, better forecasts for widespread floods, and more complete information for water-resource management, these radars have enormous impact on our economic life and well being.

The performance of these radars is a major scientific and technological milestone in the modernization of the NWS. The NWS began operational use of the WSR-88D at Norman, Oklahoma, in March 1991. The performance of the severe local storm and flash flood warning programs--before and after the availability of the WSR-88D--has been closely reviewed at several WSR-88D locations. Operational results show dramatic, consistent, and unprecedented improvements in the accuracies of warnings and lead times. Forecasters are able to observe atmospheric phenomena never before seen, so there is still more to be done to take full advantage of the capabilities of the WSR-88D.

FOCUS ON THE SECRETARY'S ASSESSMENT OF DEGRADATION OF WEATHER SERVICES

NWS modernization is proceeding under the guidance of Title VII of P.L. 102-567, the Weather Service Modernization Act. P.L. 102-567 provides for an orderly transition to a modernized NWS, without degradation of service, defined as "... any decrease in or failure to maintain the quality and type of weather services provided by the National Weather Service to the public in a service area, including but not limited to a reduction in weather radar coverage at an elevation of 10,000 feet."

To strengthen public confidence that the modernization will not result in any degradation of service, in October 1994, NOAA agreed with Congress that it would contract with the National Research Council (NRC) to develop additional independent scientific criteria to identify where weather services could be degraded as existing radars are decommissioned. The Secretary of Commerce would apply these additional criteria as well as other criteria previously recommended by the NRC and report the results to Congress.

The Secretary will report to Congress in response to the NRC study, Toward a New National Weather Service -- Assessment of NEXRAD Coverage and Associated Weather Services, which was delivered in June 1995. The Secretary's report will assess weather services in 32 areas of concern under the NWS modernization plan and will provide mitigation recommendations for areas where degradation of service would be likely.

The NRC developed additional specific criteria and procedures for the determination of "degradation of services" to be used in conjunction with the requirements of P.L. 102-567. For each of the 32 areas of concern, identified through solicitation of public comments, the Secretary's Team is applying the assessment criteria recommended by the NRC, and other criteria, in order to determine whether weather services would be degraded as a result of NWS modernization. This assessment will include an analysis of the adequacy of radar information for each weather phenomena of concern, as well as an analysis of the type and quality of all weather services provided to the affected areas.

One of the most challenging responsibilities of the team has been to assess the relative value of available NEXRAD data versus data from existing conventional radars for the areas of concern, and the effects of combining all weather information available to the forecaster in determining the potential for degradation of weather services. The NRC study provided a thorough analysis of the capability of NEXRAD and existing radars to detect particular weather phenomena. The Secretary's team has considered the NRC findings, but has moved beyond this point to consider the total characteristics of the composite system in determining the potential for service degradation. For instance, unless the forecaster has assessed the overall weather environment in anticipating the potential for severe weather and followed other preparations including considering additional data sources, severe weather events will be missed regardless of the quality of the radar data.

The Secretary's team will respond specifically to each of the six recommendations of the NRC in its report. One of the NRC's recommendations concerned the critical contribution of the Department of Defense's WSR-88Ds to the nation-wide network and the need to ensure operational availability of all WSR-88Ds in the network. I have already met with the DoD on this recommendation and we have jointly agreed to work together to achieve this objective. The Secretary's team may also develop recommendations of its own related to NWS modernized operations and the transition to modernization. The Secretary's report is scheduled to be submitted to Congress in November.

Thank you, Mr. Chairman. This concludes my testimony. I will be pleased to answer any questions that you may have.

Mr. ROHRABACHER. Thank you very much, Mr. Friday.

We will now have Mr. Hauth for Mr. Gordon.

STATEMENT OF WILLIAM E. GORDON, CHAIRMAN, NEXRAD PANEL, NATIONAL WEATHER SERVICE MODERNIZATION COMMITTEE, NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C., PRESENTED BY FLOYD HAUTH, STUDY DIRECTOR FOR THE NATIONAL WEATHER SERVICE COMMITTEE ON MODERNIZATION.

Mr. HAUTH. Mr. Chairman and Members of the Committee:

On behalf of the National Research Council, the NEXRAD Panel Chairman Dr. Gordon who is present today to respond to questions, Dr. Serafin, our Committee Chairman, who was unable to attend today; and on behalf of the members of the NEXRAD Panel and the National Weather Service Modernization Committee, I am pleased to summarize the findings and recommendations contained in the Panel's report that was published in June of 1995.

The NEXRAD Panel was formed by the National Research Council in October of 1994 following a request from the Department of Commerce which, in response to a request from the Chairman of the House Science Committee, asked for an assessment of the adequacy of the Next Generation Radar coverage for the Nation to ensure that there will be no degradation of weather services as a result of this component of the National Weather Service modernization.

We feel it is important to note the uniqueness of the study in several ways.

First of all, it examined the radar coverage in terms of the characteristics of actual weather phenomenon, specific weather phenomena.

It evaluated the ability of both the old and new radar network to detect and warn about significant weather.

The findings were based upon calculations of radar detection ranges for each weather phenomenon, and then also the consensus experience-based opinions of 35 experts in the field, including research scientists and operational forecasters.

The report focuses on radar coverage capabilities only without specific consideration of data from other weather sensing systems or networks which the panel recognizes is crucial in evaluating degradation of Weather Service.

Public concerns about the radar coverage and related weather station closures were expressed to the committee from citizens in 32 areas across the country.

Technical information provided in these letters was considered by the panel during the course of the study, and all areas of concern were identified and conveyed to the National Weather Service for consideration and site-by-site evaluations of potential degradation of coverage or related services.

Based on an intensive six-month study, the NEXRAD Panel of the committee, the National Weather Service Modernization Committee, arrived at a strong overall conclusion that weather services on a national basis will be improved substantially under the currently planned NEXRAD network.

This improvement derives from a number of factors. Among them, first, that there is a much broader coverage—much broader coverage of the area of the contiguous United States.

For specific weather phenomenon, the NEXRAD coverage is much greater than it was for the old system. This is because of the technical design features that it has, and because the NEXRAD are substantially superior, technically superior to the radars that they replace.

From this information, the panel concludes that there is no degradation of service when a NEXRAD is located at or near the site of one of the old radars. In fact, service at those locations, which constitutes a majority of the sites, will be markedly improved.

In areas where the pre-NEXRAD radar is not replaced and the service is to be provided by a NEXRAD located some distance away, the panel's analysis show that there is a potential for some degradation in radar detection coverage capability.

Using a series of maps for specific weather phenomenon, the panel identified areas of concern, and I think they have already been identified by the distinguished panel before us. These include areas now covered by the pre-NEXRAD radars located in northern Alabama, northern Indiana, northwestern North Dakota, northwestern Pennsylvania, and southeastern Tennessee.

Degradation of radar detection coverage does not necessarily imply degradation of weather service in the forecasting and warning functions.

Integration of all data sources and other elements of the composite system play a significant role in the provision of services, permitting considerable compensation for lesser detection capabilities over specific areas.

However, in general the greater the distance the pre-NEXRAD radar site is from a NEXRAD, the more likely is the degradation in radar detection coverage in portions of the area covered by the existing radar.

Similarly, there is an increased potential for degradation of associated warning services that must be compensated for by other improvements in the system through the modernization.

The panel's conclusions regarding the adequacy of coverage and service with the NEXRAD network are based on the assumption that 15 of the NEXRAD radars around the country that are currently planned to be under the control of the Department of Defense will be operated and maintained to the standards set for the national NEXRAD network.

Based on its analysis and conclusions derived from them, the panel had a number of recommendations—and I am just going to highlight several of them—where the panel has identified specific geographic areas where degradation of radar detection coverage may occur.

The National Weather Service should examine each potentially vulnerable area to determine whether such degradation would result in degradation of associated weather services. The procedures and criteria for decommissioning old radars are specified in existing National Weather Service documentation, and we advise that these be rigorously applied especially in vulnerable areas.

Additional criteria and procedures proposed by the panel should be followed in assessing the degradation of service and determining corrective actions. We expect that these should be incorporated into National Weather Service Guidelines and procedures and used in conjunction with requirements in public law.

The National Oceanic and Atmospheric Administration should take immediate steps to ensure that the 15 NEXRADs under the control of the Department of Defense, which are needed to avoid degraded coverage, function as fully committed elements of the National Weather Service's Radar Network operating with the same standards, quality, and availability as the National Weather Service-operated NEXRADs.

As with other recommendations, the panel did not consider additional costs of these items, but instead looked at the technical aspects of the network. The Storm Detection and Warning performance of the composite system as a function of range from each NEXRAD should receive an indepth—indepth—independent technical assessment that considers region-specific issues.

Of course the best time to do this would be after the entire network is in place and commissioned.

In addition to the findings and recommendations, the report provided suggested evaluation criteria for use in site-by-site evaluations of adequacy of radar coverage for specific areas, and that is the study that is currently in progress by the National Weather Service by the Secretary's Response Team. We find that wherever there is inadequate radar coverage following this assessment, that the National Weather Service should take appropriate actions to reduce the risk of adverse weather consequences to human life and property to acceptable levels.

Finally, as a personal observation by Dr. Gordon and Dr.Serafin and myself, we want to commend the Secretary's Response Team for their promptness.

They assembled and started their work within two weeks of the release of a report, and their thorough application of the assessment criteria to the site-by-site evaluations that were recommended in our report.

We understand that their report is not yet completed. We have been briefed on aspects of it, and we find that they have followed—that the process they have followed and their assessments seem to be on target to date.

Again, this last statement is our personal opinion.

I would like to offer Dr. Gordon a chance to make a couple of personal observations before our part of the testimony is ended.

STATEMENT OF DR. WILLIAM E. GORDON

Dr. Gordon. Mr. Chairman and Members, may I emphasize a point that Floyd made, that forecasts and warnings will be remarkably improved by the modernized Weather Service because much greater coverage of the NEXRAD and the NEXRAD network, because the NEXRAD is one element in the modernized system which includes a collection of other observing systems which are essential; because the data from the NEXRAD and the other systems are integrated by the AWIPS, an absolutely essential part of the modernization.

The forecasters will be swamped by data if they do not have the assistance of the computer AWIPS to digest the data, to put it in a form that can be pictured and used in a way that is required.

Finally, the forecasters will be trained to use the data. The forecasters at the moment are excited about the capabilities of the tools that are coming into their hands. Their morale is high, and that will be a very positive contribution to improving weather forecasting and weather warnings.

As a final remark, I would like to say that all of the problems that were introduced by your colleagues who were at this table a moment ago are problems that had been recognized during the course of the NEXRAD study.

Those problems have been referred to the Secretary's Response Team, and they are working diligently to find solutions.

I am confident that that team will produce solutions to the serious problems that you yourself and others have raised, and that those solutions, when they become available in November, as I think Dr. Friday said, you will find acceptable, that you will find them proper, and that they will take care of your constituents who are properly concerned about their health and their safety because of the weather.

Thank you, Mr. Chairman.

[The prepared statement and attachments of Mr. Gordon follow:]

Statement by

Dr. William E. Gordon
Chairman, NEXRAD Panel,
Committee on the Modernization of the National Weather Service

Dr. Robert J. Serafin
Chairman, Committee on the Modernization of the National Weather Service

and
Mr. Floyd F. Hauth, Study Director,
Committee on the Modernization of the National Weather Service

before the

Subcommittee on Energy and Environment

Committee on Science

U.S. House of Representatives

October 17, 1995

Mr. Chairman and Members of the Committee:

On behalf of the National Research Council, the NEXRAD panel chairman, Dr. Gordon, who is present today to respond to your questions, Dr. Serafin, our committee chair, who was unable to attend today, and on behalf of the members of the NEXRAD panel and NWS Modernization Committee, I am pleased to summarize the findings and recommendations contained in the panel's report that was published in June, 1995.

The NEXRAD panel was formed by the NRC in October 1994 following a request from the Department of Commerce, which, in response to a request from the Chairman of the House Science Committee asked for an assessment of the adequacy of the Next Generation Radar coverage for the nation, to ensure that there will be no degradation of weather services as a result of this component of the NWS modernization.

It is important to note the uniqueness of this study in that:

1. It examined radar coverage in terms of the characteristics of actual weather phenomena.
2. It evaluated the ability of both the old and new radar network to detect and warn about significant weather.
3. The findings were based upon calculations of radar detection ranges for each weather phenomenon and the consensus, experience-based, opinions of 35 experts in the field, including research scientists and operational forecasters.
4. The report focusses on radar coverage capabilities only, without specific consideration of data from other weather sensing systems or networks which the panel recognized is crucial in evaluating degradation of weather service.
5. Public concerns about radar coverage and related weather station closures were expressed to the committee from citizens in 32 areas across the country. Technical information provided in

these letters was considered by the panel during the course of the study and all areas of concern were identified and conveyed to the NWS for consideration in site-by-site evaluations of potential degradation of coverage or related services.

Modernization and associated restructuring of the National Weather Service (NWS) will usher in a new era for severe weather and flood warning and forecast services in the United States. Important advances in the science of meteorology, coupled with major new technological capabilities for observing and analyzing the atmosphere, will provide unprecedented weather service improvements over the next decade. The existing systems for making weather observations and processing and communicating data and information about the weather are obsolete and costly to maintain. The modernized NWS will obtain substantially more weather data through the use of new technology that will include Doppler radars, satellites, automated surface observations, and data assimilation on supercomputers. Advanced information processing technology will be used to integrate the various data fields and to provide them to the forecaster in useful forms. This technology will also assist in the generation and issuance of improved forecasts, warnings, and other products and services.

Based on an intensive 6-month study, the NEXRAD Panel of the NWSMC arrived at a strong overall conclusion that weather services *on a national basis* will be improved substantially under the currently planned NEXRAD network. This improvement derives from factors described in the following paragraphs.

First, in comparison with the old network, the NEXRAD network will cover a much broader area of the contiguous United States. For the detection of specific weather phenomena—supercells, mini-supercells, macrobursts, lake-effect snow, and stratiform snow—the NEXRAD coverage is much greater than it was for the old system; for hurricanes, the NEXRAD coverage is complete over the entire area of risk.

Second, because the NEXRAD radars meet or exceed their technical design specifications relevant to the detection of weather phenomena and because they are substantially superior to the radars they replace (even in the non-Doppler mode), the panel concludes there is no degradation of service when a NEXRAD is located at or near the site of one of the old radars. In fact, service at those locations, which constitute the majority of sites, will be markedly improved. The panel is confident that the introduction of NEXRADs will significantly improve overall storm detection and warning performance.

Third, the NEXRAD's Doppler feature and other technical characteristics allow for greatly increased capability for short-term forecasting ("nowcasting") of thunderstorm initiation; detection of damaging winds, such as macrobursts and wind shear; and mesocyclone detection, which is often associated with tornadoes and other severe storm hazards.

Fourth, digital signal and data processing will permit the production and display of a wide variety of automated weather products which, in turn, will improve the forecaster's ability to rapidly assimilate and use the available data, not only from their NEXRAD but also from neighboring NEXRAD sites.

Finally, the NEXRAD is only one element (although an important one) of a composite system that consists of several powerful new observational systems, including geostationary and polar satellites, automated surface observing equipment, lightning detection networks, wind profilers, and other atmospheric sounders. The composite system also includes cooperative networks of human observers and spotters, the skills of experienced forecasters, and improved numerical forecast models. These diverse data sets will be assimilated and integrated by an Advanced Weather Interactive Processing System at each Weather Forecast Office (WFO) that will connect the many parts of the system to permit effective use by specially trained staffs who prepare forecasts, warnings, and other products and services.

NWS storm warning statistics accumulated over 5 or more years at six NWS radar sites show a distinct improvement in performance associated with the installation of a NEXRAD. Data concerning warning performance as a function of range from a NEXRAD present a mixed and somewhat confusing picture. In the panel's judgment, definitive conclusions cannot be drawn from the data available at this time. Further testing in the Modernization and Associated Restructuring Demonstration and at diverse geographic locations, with particular attention to the verification data, will be necessary to draw specific conclusions with respect to the effect of distance from the radar on the quality of warning performance.

In areas where the pre-NEXRAD radar is not replaced, and service is to be provided by a NEXRAD located some distance away, the panel's analyses show that there is a potential for some degradation in radar-detection coverage capability. Areas of concern are illustrated in this report by a series of maps for specific weather phenomenon. Figures 2-3a and b (from the NRC's NEXRAD report) show an example of supercell detection coverage by the old and new network. The bottom chart indicates where coverage for supercells is potentially degraded in the NEXRAD network, with and without the DOD NEXRADs. From a series of these maps the panel identified areas that include those now covered by pre-NEXRAD radars located in northern Alabama, northern Indiana, northwestern North Dakota, northwestern Pennsylvania, and southeastern Tennessee. The northern Alabama area is a special case because the existing radar, which is to be decommissioned, is a functioning Doppler radar. As a result, the potential degradation in detection capability for this area is greater than for other sites in the pre-NEXRAD radar network. Another chart in the report shows a few areas where the switch from the pre-NEXRAD network to the new network results in a "degradation of service," as defined in P.L. 102-567, Sec. 702(4), due to "a reduction in existing weather radar coverage at an elevation of 10,000 ft."

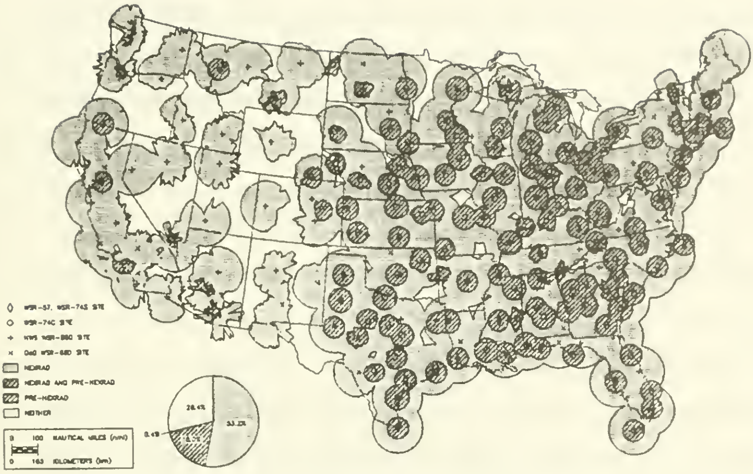

Figure 2-3a Areas of supercell detection by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and striped-blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

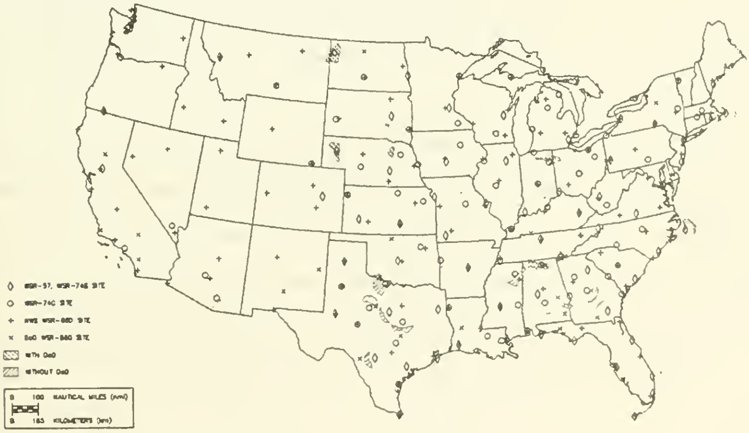

Figure 2-3b Areas with potentially degraded detection coverage for supercells by NEXRAD with DoD (red) and without DoD (blue) NEXRADs compared with the pre-NEXRAD radars. The pre-NEXRAD radars relied on the "hook echo" for supercell detection, while the NEXRAD detects mesocyclone circulation. Courtesy of SRI International.

Degradation of *radar-detection coverage* does not necessarily imply degradation of weather *service* in the forecasting and warning functions. Integration of all data sources and other elements of the composite system plays a significant role in the provision of services, permitting considerable compensation for lesser detection capabilities over specific areas. However, in general, the greater the distance the pre-NEXRAD radar site is from a NEXRAD, the more likely is the degradation in radar-detection coverage in portions of the area covered by the existing radar. Similarly, there is an increased potential for degradation of associated warning services that must be compensated for by other improvements in the system through the modernization.

The panel's conclusions regarding the adequacy of coverage and service with the NEXRAD network are based on the assumption that 15 of the NEXRAD radars (East Alabama, Alabama; Beale and March, California; Dover, Delaware; NW Florida, Florida; Moody and Robins, Georgia; Ft Polk, Louisiana; Columbus, Mississippi; Minot, North Dakota; Frederick and Vance, Oklahoma; Central Texas, Dyess, and Laughlin, Texas) currently planned to be under the control of the Department of Defense (DoD) will be operated and maintained to the standards set for the national NEXRAD network. Removal of any of these radars from the network or operation of any of them with standards and availability that are less than those of NWS-operated units will degrade radar-detection coverage.

In the national NEXRAD network, there will be four NEXRADs without a nearby WFO (i.e., Yuma, Arizona; Key West, Florida; Caribou, Maine; and Cedar City, Utah). When a WFO is remote from a NEXRAD, the reliability of the NEXRAD, the dependability of services derived from it, supporting communications and back-up capability, forecast office staffing, and warning and forecast dissemination become even more-important factors in meeting the requirements of distant service areas.

Based on its analyses and on the conclusions derived from them, the panel recommends the following:

1. Where the panel has identified specific geographic areas where degradation of radar-detection coverage may occur, the National Weather Service should examine each potentially vulnerable area to determine whether such degradation would result in degradation of associated weather services.
2. The procedures and criteria for decommissioning old radars are specified in existing National Weather Service documentation; these should be rigorously applied, especially in vulnerable areas. Additional criteria/procedures proposed by the panel should be followed in assessing the degradation of service and determining corrective actions. These assessment processes should be incorporated into official National Weather Service guidelines and procedures and used in conjunction with the requirements in P.L. 102-567.
3. The National Oceanic and Atmospheric Administration should take immediate steps to ensure that the 15 NEXRADs under the control of the Department of Defense, which are needed to avoid degraded coverage, function as fully committed elements of the national weather radar network, operating with the same standards, quality, and availability as the National Weather Service-operated NEXRADs.
4. The National Weather Service should ensure that maintenance for, operation of, and communication with NEXRADs that are not located near a Weather Forecast Office are in full accordance with network standards. In addition, responsibilities for weather services to the area covered by these NEXRADs should be unambiguously assigned to a specific Weather Forecast Office to ensure high-quality weather services for that area. Staffing and communications capability should be commensurate with each Weather Forecast Office's service area's responsibilities.

5. The storm-detection and warning performance of the composite national weather system, as a function of range from a NEXRAD, should receive an in-depth independent technical assessment that considers region-specific issues. This assessment should evaluate the warnings and reported events on a per-unit-area basis, as well as the traditional National Weather Service verification statistics. The assessment should include further testing in the Modernization and Associated Restructuring Demonstration in addition to tests at diverse geographic locations.
6. The adequacy of NEXRAD coverage with respect to the "no degradation of service" requirement should be reexamined in an independent study after all National Weather Service NEXRADs are commissioned.

In addition to findings and recommendations, the report provided suggested evaluation criteria for use in site-by-site evaluations of adequacy of radar coverage for specific areas. The suggested evaluation criteria are as follows:

1. *Weather phenomena of concern to the area*—Are the weather phenomena of concern detectable by weather radar?
2. *Degradation of radar coverage relative to the weather phenomena of concern*—Do the radar-detection coverage maps for specific weather phenomenon show degraded coverage by NEXRAD?
3. *Performance of the composite system relative to the phenomena of concern*—Does the composite system evaluation indicate that the new system performs as well as the old system?

The suggested evaluation procedures are as follows:

1. Determine the weather phenomena of concern in the area of interest.
2. Examine the relevant weather phenomena radar coverage map(s) to identify regions where radar coverage of each phenomenon is reduced from what had existed with the pre-NEXRAD system.

3. Assess the composite system capability and its impact; especially on reducing the risk to life and property. The composite system elements include, but are not limited to, those listed below.
    - characteristics of local weather phenomena;
    - radar coverage and terrain features;
    - data quality and availability;
    - local spotter network and the user community;
    - adequacy of communications within the composite system and with users;
    - education and training for the forecasters and user community; and
    - other composite system elements, such as ASOS, satellite data, soundings, prior RADAP II and/or ICRAD capability, AWIPS, centralized support products and services, and similar elements.

If an assessment of composite system performance and its consequences concludes that services related to radar coverage would be degraded, then there is inadequate radar coverage for the area. Wherever there is inadequate radar coverage, the NWS should take appropriate actions to reduce the risk of adverse weather consequences to human life and property to acceptable levels. One of the options would be to determine the cost and benefits of providing the needed detection coverage for the area of concern by adding or relocating a NEXRAD or by using some other radar alternative.

The detection coverage charts for specific weather phenomena that were developed by the panel, along with the suggested assessment criteria and procedures, provide a baseline for the NWS (or others) to make decisions on the adequacy of NEXRADs to meet the coverage and service requirements for specific areas. The panel's assessment criteria and procedures should be incorporated into official NWS guidelines and used in conjunction with the requirements in P.L. 102-567.

Finally, as a personal observation by Dr. Gordon, Dr. Serafin and myself, we commend the Secretary's response team for their prompt and thorough application of assessment criteria to the site-by-site evaluations that were recommended in the NEXRAD study. We understand that their report is not yet completed but we are impressed by the process they followed and their assessments to date. Again, this last statement is our personal opinion.

END

Toward a New National Weather Service —

ASSESSMENT OF NEXRAD COVERAGE AND ASSOCIATED WEATHER SERVICES

Prepared by the
NEXRAD Panel
National Weather Service Modernization Committee

of the
Commission on Engineering and Technical Systems
National Research Council

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Preface

This report responds to a request from the Secretary of Commerce who, in a letter dated August 18, 1994, asked the National Research Council's (NRC's) National Weather Service Modernization Committee (NWSMC) to conduct a study on the adequacy of coverage of the Next Generation Weather Radar (NEXRAD) with respect to a congressional requirement that the system result in "no degradation of service." This request was further amended by an October 5, 1994, agreement between the National Oceanic and Atmospheric Administration (NOAA) and Congressman Bud Cramer of Alabama. Accordingly, the NRC established a panel of experts to (1) review the new radar's technical specifications and network spatial coverage, (2) evaluate and compare the detection capabilities and coverage of the pre-NEXRAD and NEXRAD radars, (3) assess the performance of both networks from the standpoint of significant weather events, and (4) establish general criteria for evaluating the adequacy of coverage of the NEXRAD network and identifying areas where service might be degraded when the old radars are decommissioned. A site-by-site evaluation using these criteria was excluded from the panel's task, but the data and procedures to conduct such evaluations are included in this report.

The NWSMC has been functioning for more than 5 years under contracts between the NOAA and the NRC. Five substantive reports have been issued about the ongoing modernization of the National Weather Service (NWS) and various aspects of its planning and implementation. The NEXRAD program has been evaluated and reported upon in four of the five reports (NRC, 1991, 1992, 1994a, and 1994b), and certification criteria for critical phases of the modernization were addressed in NRC, 1993.

The panel includes three NWSMC members and two additional engineers and scientists chosen for their special competencies and with regard for appropriate balance of viewpoints and expertise. Two special technical advisors, R. Jeffrey Keeler and James Wilson, participated fully in all panel activities and contributed substantially to the written report.

The panel conducted five formal meetings and several informal, opportune meetings to gather and analyze technical data and other information, to develop evaluation criteria, and to assess the adequacy of weather radar coverage for the nation. As part of this effort, the panel developed criteria for use by the NOAA to adjudicate possible degradation issues related to decommissioning of existing radars and services provided by associated weather offices.

The panel appreciates the cooperation and extensive assistance provided by members of NOAA: the NEXRAD Joint System Program Office (JSPO), the NEXRAD Operational Support Facility, and the NWS Headquarters staff. In particular, the panel recognizes the provision of technical materials and special briefings by David Smiley, Robert Elvander, Juris Petriceks (SRI International, contractor to the NEXRAD JSPO), Donald Burgess, Paul Polger, and Richard Lane. Special thanks also to the Publications Department, Massachusetts Institute of Technology, Lincoln Laboratory, for all of the illustrations of weather phenomena and to Steven Zubrick, Weather Service Forecast Office, Sterling, Virginia, for providing the NEXRAD display for the cover.

The panel is also indebted to Peter Ray, of Florida State University, for his briefing about related studies; and to the many NWS radar operators, university, and private-sector researchers who reviewed information about radar characteristics and the ability of various radars to detect significant weather phenomena across the United States.

The panel thanks the members of the NWSMC for their review of the report and for their support and guidance during its preparation. Finally, the panel acknowledges the excellent support of three NRC staff members—Floyd F. Hauth, Study Director; Mercedes Ilagan, Study Associate; and Susan Coppinger, Administrative Assistant—as well as that of consultant/writer, Courtland S. Lewis, in carrying out the panel's work. Their services in making logistical arrangements, conducting liaison with federal agencies, universities, and the private sector and in preparing the report were invaluable.

William E. Gordon
Chairman, NEXRAD Panel
National Weather Service Modernization Committee

Contents

Executive Summary 1

1 Introduction 4
  Background: Modernization of the National Weather Service, 5
  Charge to the Committee, 6
  Study Process, 7

2 Radar Network Configuration and Detection Capabilities 8
  Network Coverage at 10,000 Feet Above Site Level, 8
  Calculated Versus Observed Detection Ranges, 11
  Comparison of Detection Coverage by Pre-NEXRAD and NEXRAD Networks, 18
  Impact of NEXRAD Communications Links and Forecast Office Staffing, 35

3 Comparison of Weather Services: Pre-NEXRAD and NEXRAD 36
  Composite System Considerations, 36
  Network Considerations, 37
  Warning Performance, 39

4 Guidelines for Assessing Possible Degradation of Service in Specific Areas 47
  Consideration of Public Concerns, 47
  Assessment Criteria, 49

5 Conclusions and Recommendations 51
  Conclusions, 51
  Recommendations, 52

References 54

Acronyms 58

Glossary 59

Appendixes 63
  A Criteria for Evaluation of a Weather Radar System, 65
  B Documents Requesting NRC Study, 87

C National Research Council's Statement of Task for the Panel on the Adequacy of NEXRAD, 95
D Drawings and Descriptions of Weather Phenomena, 96
E Reviewers and Contributors to Detection Tables 2-1 and 2-2, 102
F Distance of Old Radar from Nearest NEXRAD in Descending Order by Distance, 103

Executive Summary

Modernization and associated restructuring of the National Weather Service (NWS) will usher in a new era for severe weather and flood warning and forecast services in the United States. Important advances in the science of meteorology, coupled with major new technological capabilities for observing and analyzing the atmosphere, will provide unprecedented weather service improvements over the next decade. The existing systems for making weather observations and processing and communicating data and information about the weather are obsolete and costly to maintain. The modernized NWS will obtain substantially more weather data through the use of new technology that will include automated surface observations, Doppler radars, satellites, and data assimilation on supercomputers. Advanced information processing technology will be used to integrate the various data fields and to provide them to the forecaster in useful forms. This technology will also assist in the generation and issuance of improved forecasts, warnings, and other products and services.

The NWS' parent agency, the Department of Commerce, in response to a request from the Chairman of the Committee on Science, Space and Technology of the U.S. House of Representatives, asked the National Research Council's National Weather Service Modernization Committee (NWSMC) to "assess the adequacy of Next Generation Weather Radar (NEXRAD) coverage for the nation..." to ensure that there will be no degradation of weather services as a result of this aspect of the modernization.

Based on an intensive 6-month study, the NEXRAD Panel of the NWSMC arrived at a strong overall conclusion that weather services *on a national basis* will be improved substantially under the currently planned NEXRAD network. This improvement derives from factors described in the following paragraphs.

First, in comparison with the old network, the NEXRAD network will cover a much broader area of the contiguous United States. For the detection of specific weather phenomena—supercells, mini-supercells, macrobursts, lake-effect snow, and stratiform snow—the NEXRAD coverage is much greater than it was for the old system; for hurricanes, the NEXRAD coverage is complete over the entire area of risk.

Second, because the NEXRAD radars meet or exceed their technical design specifications relevant to the detection of weather phenomena and because they are substantially superior to the radars they replace (even in the non-Doppler mode), the panel concludes there is no degradation of service when a NEXRAD is located at or near the site of one of the old radars. In fact, service at those locations, which constitute the majority of sites, will be markedly improved. The panel is confident that the introduction of NEXRADs will significantly improve overall storm detection and warning performance.

Third, the NEXRAD's Doppler feature and other technical characteristics allow for greatly increased capability for short-term forecasting ("nowcasting") of thunderstorm initiation; detection of damaging winds, such as macrobursts and wind shear; and mesocyclone detection, which is often associated with tornadoes and other severe storm hazards.

Fourth, digital signal and data processing will permit the production and display of a wide variety of automated weather products which, in turn, will improve the forecaster's ability to rapidly assimilate and use the available data, not only from their NEXRAD but also from neighboring NEXRAD sites.

Finally, the NEXRAD is only one element (although an important one) of a composite system that consists of several powerful new observational systems, including geostationary and polar satellites, automated surface observing equipment, lightning detection networks, wind profilers, and other atmospheric sounders. The composite system also includes cooperative networks of human observers and spotters, the skills of experienced forecasters, and improved numerical forecast models. These diverse data sets will be assimilated and integrated by an Advanced Weather Interactive Processing System at each Weather Forecast Office (WFO) that will connect the many parts of the system to permit effective use by specially trained staffs who prepare forecasts, warnings, and other products and services.

NWS storm warning statistics accumulated over 5 or more years at six NWS radar sites show a distinct improvement in performance associated with the installation of a NEXRAD. Data concerning warning performance as a function of range from a NEXRAD present a mixed and somewhat confusing picture. In the panel's judgment, definitive conclusions cannot be drawn from the data available at this time. Further testing in the Modernization and Associated Restructuring Demonstration and at diverse geographic locations, with particular attention to the verification data, will be necessary to draw specific conclusions with respect to the effect of distance from the radar on the quality of warning performance.

In areas where the pre-NEXRAD radar is not replaced, and service is to be provided by a NEXRAD located some distance away, the panel's analyses show that there is a potential for some degradation in radar-detection coverage capability.[1] Areas of concern are illustrated in this report by a series of maps. These areas include those now covered by pre-NEXRAD radars located in northern Alabama, northern Indiana, northwestern North Dakota, northwestern Pennsylvania, and southeastern Tennessee.[2] The northern Alabama area is a special case because the existing radar, which is to be decommissioned, is a functioning Doppler radar. As a result, the potential degradation in detection capability for this area is greater than for other sites in the pre-NEXRAD radar network. Also shown are a few areas where the switch from the pre-NEXRAD network to the new network results in a "degradation of service," as defined in P.L. 102-567, Sec. 702(4), due to "a reduction in existing weather radar coverage at an elevation of 10,000 ft."

Degradation of *radar-detection coverage* does not necessarily imply degradation of weather *service* in the forecasting and warning functions. Integration of all data sources and other elements of the composite system plays a significant role in the provision of services, permitting considerable compensation for lesser detection capabilities over specific areas. However, in general, the greater the distance the pre-NEXRAD radar site is from a NEXRAD, the more likely is the degradation in radar-detection coverage in portions of the area covered by the existing radar. Similarly, there is an increased potential for degradation of associated warning services that must be compensated for by other improvements in the system through the modernization.

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[1] Radar-detection coverage is the area over which detectable signals are returned from various weather phenomena as the radar scans at and above the horizon. See Appendix A, page 68 for more details.

[2] A site-by-site evaluation was excluded from the panel's task, but the data, criteria, and procedures to conduct such evaluations are provided in this report.

The panel's conclusions regarding the adequacy of coverage and service with the NEXRAD network are based on the assumption that 15 of the NEXRAD radars (listed on p. 32) currently planned to be under the control of the Department of Defense (DoD) will be operated and maintained to the standards set for the national NEXRAD network. Removal of any of these radars from the network or operation of any of them with standards and availability that are less than those of NWS-operated units will degrade radar-detection coverage.

In the national NEXRAD network, there will be four NEXRADs without a nearby WFO (i.e., Yuma, Arizona; Key West, Florida; Caribou, Maine; and Cedar City, Utah). When a WFO is remote from a NEXRAD, the reliability of the NEXRAD, the dependability of services derived from it, supporting communications and back-up capability, forecast office staffing, and warning and forecast dissemination become even more-important factors in meeting the requirements of distant service areas.

Based on its analyses and on the conclusions derived from them, the panel recommends the following:

1. Where the panel has identified specific geographic areas where degradation of radar-detection coverage may occur, the National Weather Service should examine each potentially vulnerable area to determine whether such degradation would result in degradation of associated weather services.
2. The procedures and criteria for decommissioning old radars are specified in existing National Weather Service documentation; these should be rigorously applied, especially in vulnerable areas. Additional criteria/procedures proposed by the panel (described in Chapter 4, under "Assessment Criteria and Procedures") should be followed in assessing the degradation of service and determining corrective actions. These assessment processes should be incorporated into official National Weather Service guidelines and procedures and used in conjunction with the requirements in P.L. 102-567.
3. The National Oceanic and Atmospheric Administration should take immediate steps to ensure that the 15 NEXRADs under the control of the Department of Defense, which are needed to avoid degraded coverage, function as fully committed elements of the national weather radar network, operating with the same standards, quality, and availability as the National Weather Service-operated NEXRADs.
4. The National Weather Service should ensure that maintenance for, operation of, and communication with NEXRADs that are not located near a Weather Forecast Office are in full accordance with network standards. In addition, responsibilities for weather services to the area covered by these NEXRADs should be unambiguously assigned to a specific Weather Forecast Office to ensure high-quality weather services for that area. Staffing and communications capability should be commensurate with each Weather Forecast Office's service area's responsibilities.
5. The storm-detection and warning performance of the composite national weather system, as a function of range from a NEXRAD, should receive an in-depth independent technical assessment that considers region-specific issues. This assessment should evaluate the warnings and reported events on a per-unit-area basis, as well as the traditional National Weather Service verification statistics. The assessment should include further testing in the Modernization and Associated Restructuring Demonstration in addition to tests at diverse geographic locations.
6. The adequacy of NEXRAD coverage with respect to the "no degradation of service" requirement should be reexamined in an independent study after all National Weather Service NEXRADs are commissioned.

1

Introduction

Modernization and associated restructuring of the National Weather Service (NWS) will usher in a new era for severe weather and flood warning and forecast services in the United States. Important advances in the science of meteorology, coupled with major new technological capabilities for observing and analyzing the atmosphere, will provide unprecedented weather service improvements over the next decade. The existing systems for making weather observations and processing and communicating data and information about the weather are obsolete and costly to maintain. The modernized NWS will obtain substantially more weather data through the use of new technology, which will include automated surface observations, Doppler radars, satellites, and data assimilation on supercomputers. Advanced information processing technology will be used to integrate the various data fields and provide them to the forecaster in useful forms, as well as to assist in generating and issuing improved forecasts, warnings, and other products.

In the transition from the old system to the new, Congress and others have expressed concerns about the adequacy of the new radar network to detect significant weather events over vulnerable areas of the contiguous United States such that there will be no degradation of the service currently provided by the NWS.[1] It is important to note that degradation in any one component of the new system, including NEXRAD coverage, does not necessarily imply a net degradation in the overall system. Congress asked the National Research Council (NRC) and its National Weather Service Modernization Committee (NWSMC) to address these concerns. This report is the result of a 6-month study conducted by a panel of radar engineers and meteorologists qualified by training and experience.

The background leading to the study, the charge to the committee/panel, and the study process followed by the panel are described in the section entitled "Background: Modernization of the National Weather Service." To determine the technical adequacy of the new Doppler radar with respect to the "no degradation of service" requirement, the panel defined and mapped the radar-detection capabilities in Chapter 2. This analysis provided the basis for a comparison of the old and new systems, which is discussed in Chapter 3. The panel's comparison was made with respect to weather services, that is, warnings that involve a forecaster and his/her expertise, supported by all of the available information. This information includes both radar observations and a wide variety of other observational information that is provided by the new technology and by other elements of the composite national weather system.

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[1] Use of "contiguous United States" in this report will denote the 48 contiguous states (i.e., not including Alaska or Hawaii). Degradation of services related to radar-detection services is not a factor in Alaska and Hawaii since NEXRADs will provide new coverage capabilities in both states. (There was no NWS radar coverage prior to NEXRAD.)

Guidelines for assessing potential degradation of service at specific sites are discussed in Chapter 4. The panel's conclusions and recommendations are listed in Chapter 5.

General criteria for evaluating a weather radar system and the technical aspects of radars—system configuration, spatial coverage, resolution, and sensitivity—are detailed in Appendix A. While a site-by-site evaluation was excluded from the panel's task, these criteria, guidelines, and data will allow others to conduct such evaluations.

References, a list of acronyms, and a glossary are provided at the end of the report.

BACKGROUND: MODERNIZATION OF THE NATIONAL WEATHER SERVICE

In the late 1980s, the NWS embarked on a modernization and restructuring of its operations and the associated field office structure. When completed, this modernization will provide a much-needed updating of the technologies used to observe weather features (especially often-destructive phenomena, such as severe thunderstorms, tornadoes, wind shear, flash floods, and hurricanes) and will include new information systems that will enable the NWS to provide more accurate and timely weather forecasts and warnings to the public.

The new observing systems include the Weather Surveillance Radar-1988 Doppler (WSR-88D) Next Generation Weather Radar (NEXRAD), the Automated Surface Observing System (ASOS), and the next generation of Geostationary Operational Environmental Satellites (GOES). In the new system, an Advanced Weather Interactive Processing System (AWIPS) will process the large volume of information, provide the forecaster with information in useful forms, and provide an interactive communications link among the offices.

The associated restructuring of the NWS is driven by these new technologies. The current field office structure includes 52 Weather Service Forecast Offices (WSFOs), whose responsibilities are organized on a geographical basis; about 200 smaller offices, including Weather Service Offices (WSOs) and Weather Service Meteorological Observatories, which manually take surface observations and, in some instances, weather radar observations (and, in the case of WSOs, issue local-area forecasts and warnings); and 13 River Forecast Centers (RFCs) (NWS, 1985, 7 and 21). The new, modernized structure of the NWS will include 118 Weather Forecast Offices (WFOs), 112 of which will be located in the contiguous United States, at sites determined primarily by the locations of the NEXRADs, and the 13 RFCs (NRC, 1993, 12). Even though there will be a substantial reduction in the total number of field offices, the new organizational structure is intended to provide equivalent or improved services.

The modernization process is now well underway with the ongoing deployment of the new NEXRAD and ASOS observational technologies and the successful launch of a GOES-8 satellite in April 1994. Development of AWIPS is in progress.

The NEXRAD

One cornerstone of the modernization program is the NEXRAD, more accurately described as the WSR-88D. In addition to conventional reflectivity observations, this advanced radar uses the

"Doppler effect"[1] to measure motion of clear air and atmospheric phenomena within storms, up to a maximum distance of 230 km from the radar. This allows much more accurate detection of circulations associated with tornadoes and other significant weather. NEXRADs will replace a network of 128 older radars that were concentrated east of the Rocky Mountains, primarily in the central and eastern United States. A comparison of radar characteristics is provided in Appendix A.

The 138 NEXRADs to be deployed in the contiguous United States will provide national coverage. The NWS will operate 116 of the NEXRADs; the Department of Defense (DoD) will operate 22. Through AWIPS, forecasters in the new field offices will work interactively with all of the available data. The deployment of these radars nationwide is spread across a 6-year period (1990-1996). As of April 1995, 116 NEXRADs had been installed.

CHARGE TO THE COMMITTEE

The charge transmitted by the Secretary of Commerce to the NRC (Appendix B) calls for the NWSMC to

> assess the adequacy of NEXRAD coverage from a scientific and technical standpoint, in terms of the no degradation of service requirement of the Weather Service Modernization Act, P.L. 102-567.

The Act, section 702 (4), states that

> degradation of service means any decrease in or failure to maintain the quality and type of weather services provided by the National Weather Service to the public in a service area, including but not limited to a reduction in existing weather radar coverage at an elevation of 10,000 feet.

This request from the Secretary of Commerce was amended by an October 5, 1994, agreement between National Oceanic and Atmospheric Administration (NOAA) and Congressman Cramer of Alabama. In accordance with this agreement (see sections 4 and 5, "Study Guidelines," in Appendix B) the panel agreed to receive public comments and "to conduct an independent scientific assessment of the proposed NEXRAD radar coverage and consolidation of field offices[2] in terms of 'no degradation of services' and to establish criteria for identifying service areas where the decommissioning of existing radars could degrade service." The panel did not explicitly address nontechnical issues, such as economic, safety, and population risk factors, that were beyond the scope of this study. The Statement of Task of the NRC's NEXRAD Panel of the NWSMC is in Appendix C.

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[1] The Doppler effect is the change in frequency of electromagnetic radiation (light, radio waves, radar pulses, etc.) or sound waves as the point of emission or reflection approaches or recedes from an observer. An example is the change in pitch of an emergency vehicle siren as it approaches and passes an observer.

[2] "Consolidation of field offices" is, among other things, tied to the decommissioning of existing radars and associated transfer of service responsibilities. Thus, the only scientific assessment that is applicable pertains to the technical aspects of radar-detection coverage and the associated forecast and warning services for the service area of the radar.

STUDY PROCESS

Panel members interviewed many people who were familiar with NEXRAD and solicited opinions from meteorologists and others on NEXRAD's performance. The interviewees reflected a high level of satisfaction with the capabilities of the NEXRAD and an enthusiasm for the operation and outputs of the radar. This suggests that there is a high level of confidence in the performance of the system and the quality of its associated services.

Making a balanced comparison of weather radar systems to ascertain a possible "degradation of service" requires the use of objective criteria upon which to base the comparison. In a broad sense, the important criterion is the system's ability to recognize and respond to significant weather features of concern. These criteria and the technical aspects of a radar that relate to its detection capability are discussed in Appendix A.

The panel reviewed the history of the NEXRAD siting plans and was briefed by NOAA personnel and others on technical aspects of the program. At the panel's request, NOAA asked SRI International to provide spatial coverage, resolution, and sensitivity charts for elevations 4,000 ft, 6,000 ft, 10,000 ft, and 40,000 ft above site level for the entire contiguous United States. It soon became apparent to the panel that the detection of specific types of weather phenomena needed to be quantified and compared (see Chapter 2) in order to assess NEXRAD and pre-NEXRAD detection coverage realistically.

The panel derived detection ranges for several significant weather phenomena. Site-specific coverage characteristics for five weather phenomena were used to generate coverage charts for the pre-NEXRAD and NEXRAD networks. At the panel's request, NOAA asked SRI to prepare "difference charts," which the panel analyzed to determine areas where the decommissioning of old radars could result in a degradation of radar-detection coverage (see Chapter 2).

Where sufficient data were available (see Chapter 3), the panel reviewed warning performance data and compared pre-NEXRAD and NEXRAD operations at weather offices in different areas of the country. The panel also reviewed these data in the context of the overall composite system considerations of the pre-NEXRAD and NEXRAD networks.

Finally, the panel developed criteria (see Chapter 4) to use as guidelines in assessing possible degradation of service in areas where the decommissioning of existing radars, and changes in related services provided by the associated weather offices, might be in question.

2

Radar Network Configuration and Detection Capabilities

NETWORK COVERAGE AT 10,000 FEET ABOVE SITE LEVEL

The pre-NEXRAD NWS radar network consisted of 128 WSR-57, WSR-74S, and WSR-74C radars concentrated primarily in the central and eastern United States. The WSR-57 and WSR-74S radars, both 10-cm wavelength systems, were configured as manually operated surveillance radars. The 68 WSR-74C radars functioned as "local warning" radars and often were operated only during periods of significant weather. In recent years, three of the pre-NEXRAD radars had some Doppler capability; two of these have been replaced by NEXRADs at nearby sites.

The pre-NEXRAD radars routinely scanned only at low elevation angles in the surveillance mode and were operated manually for other scans, such as vertical scans in the range-height indicator mode. Figure 2-1a indicates the composite coverage provided by the pre-NEXRAD network at 10,000 ft above site level over the contiguous United States and bordering areas.[1] Here "coverage" means that the lower edge of the radar beam, as determined from the radar horizon with standard atmospheric refraction and with due consideration of any blockage by intervening terrain, would intercept any weather phenomenon reaching at least that altitude (see Appendix A, pages 68–70). The altitude of 10,000 ft is used here only because the charge to the panel asked for an examination of any reduction in radar coverage at 10,000 ft. This request stems from the definition in P.L. 102-567, Sec. 702(4) that "'degradation of service' means any decrease in or failure to maintain the quality and type of weather services provided by the National Weather Service to the public in a service area, including ... a reduction in existing weather radar coverage at an elevation of 10,000 feet." From a scientific point of view, there is no compelling reason to specify this or any other specific height, however, because the requisite altitude coverage for detecting various weather phenomena differs for each phenomenon. Thus, coverage at the 10,000-ft level gives no guarantee that every phenomenon of concern can be detected.

The NEXRAD network, when complete, will consist of 138 10-cm wavelength NEXRADs in the contiguous United States, including 22 operated by the DoD. All of these NEXRADs are computer-controlled radars that are designed to operate continuously in a three-dimensional, volume-scan mode. Figure 2-1b indicates the composite coverage at the 10,000-ft level that will be provided by the

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[1] Above site level (ASL) altitudes are used since the siting documentation and data base are given in terms of ASL. Certain radars in the West (e.g., Tucson) are located on mountains high above the surrounding ground level (AGL). Therefore, ASL and AGL altitudes may differ by several hundred or even thousands of feet.

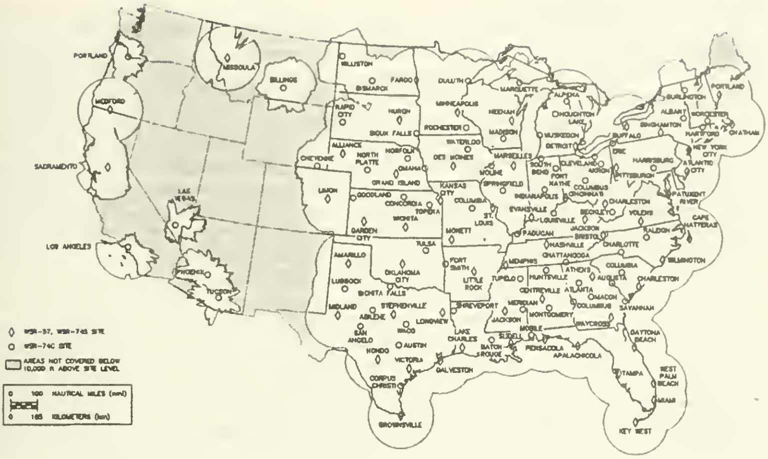

Figure 2-1a Composite pre-NEXRAD coverage at 10,000 ft above site level for the contiguous United States and the locations of the radars by type. Courtesy of SRI International.

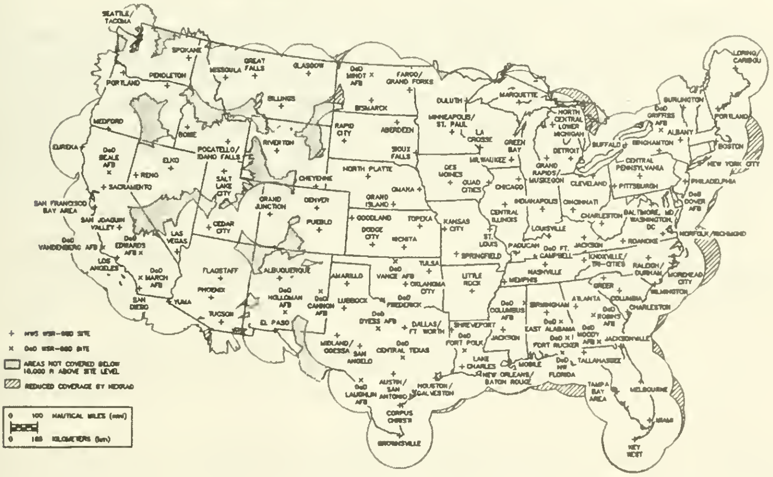

Figure 2-1b Composite NEXRAD coverage at 10,000 ft above site level for the contiguous United States and the locations of NWS and DoD sites. This figure also shows those areas (striped blue) where there will be reduced coverage at 10,000 ft by the NEXRAD network compared with that which existed with the pre-NEXRAD network, as specified in P.L. 102-567, Sec. 702(4). Courtesy of SRI International.

NEXRAD network in the contiguous United States.[1] Coverage will be nearly complete over the central and eastern United States. In addition, the previous gaps in coverage over the western United States will be reduced substantially. Figure 2-1b also shows (striped blue) where the coverage by the NEXRADs at 10,000 feet is reduced from that provided by the pre-NEXRAD radars. The 10,000-foot requirement is defined in P.L. 102-567, Sec. 702(4).

Over land, the areas where coverage is reduced include small portions of North Dakota, Montana, and Wyoming. As noted in Chapter 1 in the section on study process, to make a meaningful assessment of adequacy of coverage, radar coverage also must be considered in terms of the resolution and sensitivity of the radars with respect to specific weather phenomena. These aspects of radar coverage are examined and discussed later in this chapter and in Appendix A.

The NEXRAD network will be capable of detecting tall storms anywhere in the contiguous United States and in most of the 230-km bordering area. Specifically, any storm reaching a height of at least 26,000 ft above site level will extend through at least the lower half of the beam of some NEXRAD in the network (scanning at the lowest elevation angle). However, for shallower phenomena, NEXRAD will not provide detection coverage at the desired altitudes over the entire contiguous United States; therefore, coverage for locations far from NEXRAD sites, but close to pre-NEXRAD radars, needs to be examined more closely. The section entitled "Comparisons of Detection Coverage by Pre-NEXRAD and NEXRAD Networks," later in this chapter, discusses the panel's review of this coverage. It is important to note that the old network did not provide full coverage for shallow weather phenomena.

CALCULATED VERSUS OBSERVED DETECTION RANGES

Critical to assessing the possibility that any degradation of service may exist in a particular geographic area is the need to quantify the range to which significant weather phenomena can be detected by the old and new radars. In some situations the radar detects weather events directly, leading the forecaster to issue warnings or advisories. These events include hurricanes, strong surface winds, heavy rain, heavy snow, and wind-shift lines. In other situations, features detected by the radar are only indirectly related to the actual weather event. This is the case for tornadoes, hail, and precipitation amount. Large tornadoes at relatively close radar range are an exception because the tornado circulation can be seen by a radar in Doppler mode (appearing as a "tornadic vortex signature," or TVS), even though the circulation may not be fully resolved.[2]

Research has shown (Burgess and Lemon, 1990) that rotating thunderstorms, which are associated with mesocyclones or misocyclones, often produce tornadoes or other severe weather like hail and strong surface winds. However, not all rotating thunderstorms produce severe weather, and not all severe weather is associated with rotating thunderstorms. Thus, more than radar information goes into the issuance of a tornado or severe-storm warning. The forecaster integrates atmospheric stability and melting level information, wind profiles, numerical model outputs, and other environmental characteristics to determine the potential for significant weather. Spotter reports, features observed in satellite data, and other weather observations supplement the radar data as aids for the forecaster to make a decision to issue a warning.

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[1] For a NEXRAD operating with a 1-degree beamwidth and scanning at 0.5 degrees elevation, the lower edge of the detection cone crosses the 10,000-ft elevation dictated by P.L. 102-567 when the beam is 230 km from the radar. (Terrain or other obstructions to the beam will reduce the range of coverage. Technology considerations limit the usable NEXRAD Doppler range to 230 km.)

[2] Drawings and descriptions of weather phenomena are provided in Appendix D.

The panel used two methods to determine the maximum range at which significant weather phenomena can be detected by the old and new radars. The first method was to describe the phenomenon in terms of its physical dimensions and radar reflectivity factor and use the radar characteristics to calculate the maximum range at which the phenomenon could be detected. The second method was to survey the observational experience of research and operational meteorologists. The results of these two methods are presented as Tables 2-1 and 2-2. To ensure credibility of the results, the panel distributed the tables twice to a large cross-section of the weather research and operational communities for their comments. A total of 35 people (listed in Appendix E) provided comments. After the revisions this process produced, there was no significant disagreement among the panel members or the 35 respondents as to the data shown in the tables.

The pre-NEXRAD network contained three radars with various levels of Doppler capability. These radars were located in Huntsville and Montgomery, Alabama, and in Marseilles, Illinois. The radars in Montgomery and in Marseilles were replaced by nearby NEXRADs; the radar in Huntsville is still in use. The NWS currently plans to decommission the Huntsville radar and provide detection-coverage service for that area from NEXRADs at Birmingham, Alabama; Nashville, Tennessee; and other adjacent NEXRADs. The capabilities of the Huntsville WSR-74 Doppler radar are included in Table 2-1 to allow a comparison of the existing radar with the planned NEXRAD coverage.

Table 2-1 describes the characteristics (top, limiting horizontal extent, and reflectivity) that the panel used to calculate the maximum ranges at which various weather phenomena can be detected. The typical spread of the values for each characteristic is listed, along with an estimated median value. These values take into account regional and seasonal differences, but the limits do not include extreme cases. In the case of reflectivity, the values refer to average values within the phenomena. The spread of values is based on the scientific literature (see references) as well as on the panel's experience and that of those who responded to the mailings.

Calculations of the range for each radar and each phenomenon shown in the table were based on the panel's assumption that a phenomenon can be detected if (1) the center of the beam at a 0.5 degree elevation angle is at or below the top of the phenomenon; (2) the half-power beam width for supercells, mini-supercells, and misocyclones is less than one-half of the horizontal diameter of the rotation, while for all other phenomena the half-power beam width is less than the smallest azimuthal dimension; and (3) the minimum detectable signal at a particular range is less than the radar reflectivity factor of the phenomenon. (The minimum detectable signal for each radar is found in Appendix A, Table A-1.)

Table 2-2 provides a comparison of calculated and experienced maximum ranges for detection of various radar-observed phenomena by pre-NEXRAD radars and NEXRAD. The table is based on two sources of information: the theoretical calculations given in Table 2-1 and forecaster/researcher experience.

In Tables 2-1 and 2-2, the WSR-57 and WSR-74S radars are grouped together because their beam widths and minimum detectable signals are very similar. The most range-limiting of the three characteristics of the phenomena is given in Table 2-2 as the calculated maximum range. The altitude of the top of the phenomenon is often the limiting characteristic. For the calculations of maximum range, the altitude of the top of the phenomenon is assumed to be radar-independent. In two cases, convergence lines and lake-effect snow, the minimum detectable signal is also a significant factor. The horizontal dimension is the limiting characteristic for mesocyclone and misocyclone; the vertical dimension is the limiting characteristic for the bright band.

As the tables indicate, the Doppler feature of the NEXRAD provides a new capability for directly measuring several weather phenomena and winds within the phenomena. These phenomena include tornadoes, mesocyclones, misocyclones, microbursts, macrobursts, convergence lines, and winds within hurricanes, precipitation, and the clear-air boundary layer. The confidence in detecting supercells, mini-supercells, and macrobursts using Doppler radar is much higher than with non-Doppler radars, since the detection is direct and reliable. Supercells are rotating thunderstorms whose circulation can be detected directly in the Doppler velocities, but which can only occasionally be inferred indirectly by a hook-shaped radar reflectivity feature with non-Doppler radars. Macrobursts are strong surface winds associated with some thunderstorms, which (using the old radars) occasionally can be inferred from a bow-shaped radar reflectivity signature. Fujita (1985) has shown that the most dangerous phase of downburst storms occurs when radar returns are developing a distinctive bow-echo appearance; at that time wind damage has already occurred in many cases. The NEXRAD can provide earlier precursor information, and the Doppler capability can detect the winds directly.

In addition to listing the calculated maximum range values, Table 2-2 also lists the observed maximum range for each phenomenon and each radar in the "Experience" column. These values reflect the actual experience of forecasters and researchers who use the radars to observe specific weather phenomena.[1] The spread of maximum range values shown within the brackets under the "Experience" column represents differences caused by seasonal, geographic, and meteorological factors. The number in front of the bracket is a subjective estimate of a median maximum range value that would be applicable within the contiguous United States.

The calculated values admittedly contain many assumptions, but they are, nevertheless, very useful for providing an independent consistency check of the experience values. Comparison of the calculated and experience values in Table 2-2 shows general agreement. However, there are some apparent disagreements, including the following:

- The maximum-range values for detecting mesocyclones and misocyclones with the NEXRAD, as shown in the "Experience" column in Table 2-2, are lower than the calculated values. The panel believes that this difference is due to the assumed detection criteria; that is, only two samples are needed over the diameter of the weather phenomena circulation. While theoretically this low number of samples would allow the feature to be detected, its magnitude would be greatly underestimated in the actual observation (Carbone et al., 1985).
- The calculated maximum ranges for detecting stratiform snow and lake-effect snow, particularly for the wider-beamed pre-NEXRAD radars, are greater than experience indicates. The panel believes that the calculations do not fully account for partially filled beam effects, which are particularly prevalent for these features because of the relatively sharp decrease in reflectivity near the top of the phenomenon (see cloud/snow illustration in Appendix A, Figure A-3). As a result, in these situations, the measured reflectivity could even be below detectable thresholds. Also, when the contoured displays of the phenomena were viewed on the old radars, the display thresholding tended to remove much of the snow return.

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[1] A list of forecasters and researchers who contributed to the experience values is provided in Appendix E. This list included responses from experts at 11 NWS operational sites, many with experience in operating NEXRAD and pre-NEXRAD radars. In many instances, the participants conferred with their colleagues at the site listed in developing their estimates. Their experience values were in good agreement with those from other operational sites and from technical experts from research and development locations. These values were in general agreement with the panel's calculated values and reflected relatively conservative interpretation of detection coverage for each significant weather phenomenon.

TABLE 2-1 Calculated Maximum Ranges for Detecting Various Radar-Observed Phenomena for the WSR-57, WSR-74S, WSR-74C, WSR-74 Doppler and NEXRAD. The calculated ranges are based on the observed characteristics of the phenomena. For the characteristics shown, the bracketed numbers represent the typical spread of observed values (extreme values are not included). The number in front of the bracket is the estimated median value. These values are used in determining the calculated maximum range. NSDL = No significant detection limitation. NC = No capability. Values >460 km are not indicated since this is the maximum display range of the NEXRAD.

	Characteristics			Calculated Maximum Range (km)											
				WSR-57 / 74S			WSR-74C			WSR-74 Doppler			NEXRAD		
Phenomena	Top[a] (km)	Limiting Horizontal Dimension (km)	Reflectivity[b] (dBZ)	Top (km)	Horz (km)	Refl (km)	Top (km)	Horz (km)	Refl (km)	Top (km)	Horz (km)	Refl (km)	Top (km)	Horz (km)	Refl (km)
Hurricane															
eye wall	12[8-16]	45[15-70]	45[40-55]	386	>460	>460	386	>460	>460	386	>460	>460	386	>460	>460
winds	12[8-16]	NSDL	35[25-45]	NC	NC	NC	NC	NC	NC	136[c]	136[c]	136[c]	230[d]	>230[d]	>230[d]
Supercell															
mesocyclone	7[4-10]	8[4-12]	45[25-60]	NC	NC	NC	NC	NC	NC	136[c]	136[c]	136[c]	230[d]	>230[d]	>230[d]
hook echo[e]	2[1-4]	8[4-12]	45[25-60]	126	120	>460	126	192	>460	126	192	>460	126	240	>460
Mini-Supercell															
miso- or mesocyclone	4[2-8]	4[1-8]	35[20-60]	NC	NC	NC	NC	NC	NC	136[c]	120	136[c]	199	120	>230[d]
hook echo[e]	1[0.5-2]	4[2-8]	35[20-60]	77	60	>460	77	96	>460	77	96	>460	77	120	>460
Misocyclone[f]	1[0.5-3]	2[0.5-4]	20[5-50]	NC	NC	NC	NC	NC	NC	77	60	136[c]	77	60	>230[d]
Tornadic Vortex[g] Signature	3[1-6]	0.2[.02-2]	40[25-55]	NC	NC	NC	NC	NC	NC	136	-[h]	136[c]	165	-[h]	>230[d]
Microburst	0.5[0.3-1.2]	3[2-4]	45[5-65][i]	NC	NC	NC	NC	NC	NC	45	136[c]	136[c]	45	180	>230[d]
Macroburst															
reflectivity signature[j]	3[1-5]	50[15-100]	40[30-50]	165	>460	>460	165	>460	>460	165	>460	>460	165	>460	>460
velocity signature	1.0[0.5-2]	15[4-30]	50[40-65]	NC	NC	NC	NC	NC	NC	77	136[c]	136[c]	77	>230[d]	>230[d]
Precipitation Detection															
convective rain	9[5-17]	NSDL	40[25-65]	327	NSDL	>460	327	NSDL	>460	327	NSDL	>460	327	NSDL	>460
stratiform rain	6[3-8]	NSDL	30[15-45]	255	NSDL	>460	255	NSDL	>460	255	NSDL	>460	255	NSDL	>460
stratiform snow	5[1-7]	NSDL	20[10-30]	226	NSDL	160[k]	226	NSDL	210[k]	226	NSDL	210[k]	226	NSDL	>460
lake-effect snow	2[1-3]	NSDL	20[10-30]	145	NSDL	130[k]	145	NSDL	130[k]	145	NSDL	130[k]	145	NSDL	150[k]
Winds															
boundary layer[m]	1.5[0.5-3]	NSDL	10[-5-20]	NC	NC	NC	NC	NC	NC	103	NSDL	136[c]	103	NSDL	>230[d]
high sfc winds with precipitation	1.5[0.5-3]	NSDL	30[15-45]	NC	NC	NC	NC	NC	NC	103	NSDL	136[c]	103	NSDL	>230[d]
profiles[n]				NC	NC	NC	NC	NC	NC						

Convergence Lines[p]	1[0.3-4]	3[1-5]	10[-5-45]	77	86	100[n]	77	138	120[n]	77	138	120[n]	77	180	>460
Melting level (bright band)	1.5[1-3][r]	0.3[0.2-0.5][s]	35[20-45]	103	9	>460	103	14	>460	103	14	>460	103	18	>460

NOTES

a. In general the feature extends from the ground to the indicated top. However, mesocyclone and tornadic vortex signatures may not extend to the ground.

b. The indicated reflectivity is the near-surface typical value; the reflectivity generally decreases rapidly near the top of the feature. This is generally not a limiting consideration except for snow and convergence lines; see appropriate footnotes for these features.

c. Limiting range in Doppler mode is 136 km.

d. Doppler velocity available only to 230 km and sometimes only to half of that range.

e. Reflectivity signatures resembling hooks are sometimes observed with meso- and misocyclones but often the feature is absent or misleading.

f. This refers to misocyclones observed in the boundary layer along convergence lines in either clear air or precipitation. Misocyclones observed aloft in precipitation are covered under mini-supercells.

g. Tornadoes occasionally will cause large beam-to-beam velocity differential values. This subject has been extensively discussed by Brown et al. (1978).

h. As discussed by Brown et al. (1978), a tornadic vortex signature can be detected in the radial velocity field even when the rotation is smaller than the half-power beam width of the radar. Their Figure 7 shows that regardless of tornado diameter or rotational velocity, extreme values could occur one beam width apart in the azimuthal direction. Based on their discussion, there is no convincing way to compute a theoretical value; thus, none is given here.

i. Microbursts may occur with a wide range of reflectivities. The low-reflectivity (dry) ones typically have reflectivities from 5 dBZ to 30 dBZ. Low- and high-reflectivity microbursts are not separated here since reflectivity is not a limiting criterion for detection of either one.

j. The observation of "bow-shaped" echoes in reflectivity is often indicative of storms that produce strong surface winds (Fujita, 1981).

k. When calculating the maximum detection range for snow, the vertical profile of reflectivity should be considered rather than the single low-level value indicated in the Characteristics column. This is because the echo tops are relatively low, and the beam may be intercepting reflectivities considerably less than the low-level value. Typical lake-effect snow and stratiform snow reflectivity profiles from Wilson (1975) were used for this calculation.

m. These numbers refer to the warm season (temperature > 10° C). At that time winds can be obtained through the depth of the boundary layer primarily as a result of scattering from insects and secondarily from refractive index fluctuations principally in the vicinity of inversions. Nocturnal wind measurement, particularly in the Great Plains, may be contaminated by bird migrations. During the cool season, clear-air return is limited to scattering from refractive index fluctuations, which nominally can't be detected beyond about 20 km.

n. For this phenomenon the limitation is height, rather than range. The profile is representative of the area in the immediate vicinity of the radar for heights of detectable echo. For nonprecipitation situations in the warm season, the profiles are limited in height to the depth of the boundary layer (1 km to 3 km). In the cool season clear-air winds are very limited.

p. Included are all forms of convergence lines, such as sea breezes, gust fronts, dry lines, topography-induced convergence lines, coastal fronts, and synoptic fronts. These convergence lines may occur with or without precipitation. The majority are clear-air phenomena that are most easily observed at a greater height than the velocity convergence signature. In precipitation the convergence line is observed only as a Doppler velocity signature. The characteristics listed here are for the reflectivity thin line during the warm season. Cool-season reflectivity thin lines are seldom observed beyond 10 km to 30 km. During the cool season, fronts associated with precipitation can be detected from Doppler velocity convergence signatures.

q. The vertical profile of reflectivity within the line partially based on Wilson et al. (1994) was used instead of the single low-level value in the Reflectivity Characteristics column.

r. This height interval is chosen as being operationally significant for monitoring the melting level height to anticipate surface precipitation changes from rain to snow.

s. In this case the vertical dimension is considered, since it is the more-limiting dimension. The numbers refer to the vertical dimension of the bright band, which averages about 10 dB more than the values above and below.

References Consulted: Battan, 1973; Brown et al., 1978; Burgess and Lemon, 1990; Burgess et al., 1993; Burpee, 1986; Carbone et al., 1990; Fabry et al., 1992; Fujita, 1981; Hjelmfelt, 1988; Joss and Waldvogel, 1990; Klingle et al., 1987; Kingsmill and Wakimoto, 1991; Mahoney, 1988; Marks, 1990; Mueller and Carbone, 1987; Pettit, 1990; Wakimoto, 1982; Wakimoto and Wilson, 1989; Weckwerth and Wakimoto, 1992; Wilson, 1975; Wilson and Brandes, 1979; Wilson et al., 1984; Wilson et al., 1994.

TABLE 2-2 Comparison of Calculated and "Experienced" Maximum Range Values for Detecting Various Radar-Observed Phenomena for the WSR-57, WSR-74S, WSR-74C and NEXRAD. Calculated values are the most range-limiting value for each phenomenon in Table 2-1. The "Experience" columns reflect the actual experience of trained forecasters and researchers who have used the equipment. The typical spread of values is due to seasonal, geographic, and meteorological variations. The number in front of the brackets is the estimated median, defined here as the "experienced" median maximum range. NC = No Capability.

Phenomena	Calculated Median Maximum Range (km)			"Experience" Median Maximum Range (km) and [typical maximum range values]		
	WSR-57 -74S	-74C	NEXRAD	WSR-57 -74S	-74C	NEXRAD
Hurricane						
eye wall	386	386	386	350[250-450]	375[275-450]	400[300-460]
winds	NC	NC	230[a]	NC	NC	230[a]
Supercell						
mesocyclone	NC	NC	230[a]	NC	NC	180[150-230]
hook echo	120	126	126	75[20-120]	85[25-140]	100[40-160]
Mini-Supercell						
miso- or mesocyclone	NC	NC	120	NC	NC	100[70-150]
hook echo	60	77	77	45[15-55]	55[20-80]	70[30-110]
Misocyclone	NC	NC	60	NC	NC	35[10-70]
Tornadic Vortex Signature	NC	NC	*[b]	NC	NC	45[10-130][c]
Microburst	NC	NC	45	NC	NC	35[20-50]
Macroburst						
reflectivity signature	165	165	165	150[100-200]	150[100-225]	150[100-250]
velocity signature	NC	NC	77	NC	NC	70[50-100]
Precipitation Detection[d]						
convective rain	327	327	327	300[150-450]	325[175-450]	350[200-460]
stratiform rain	255	255	255	225[125-300]	235[140-325]	250[150-350]
stratiform snow	160	210	226	120[60-150]	140[70-160]	180[120-240]
lake-effect snow	130	130	145	60[30-90]	80[40-140]	120[80-160]

Phenomena	Calculated Median Maximum Range (km)			"Experieoce" Median Maximum Range (km) and [typical maximum range values]		
	WSR-57 -74S	-74C	NEXRAD	WSR-57 -74S	-74C	NEXRAD
Winds						
boundary layer (warm season)	NC	NC	103	NC	NC	80[20-120]
high surface winds with precip.	NC	NC	103	NC	NC	70[20-120]
profiles within cloud and precip.	NC	NC	••	NC	NC	••
Convergence Lines (warm season)	77	77	77	limited[f]	limited[f]	80[40-120]
Melting level (bright band)	9	14	18	20[10-30]	35[20-40]	45[25-70]

NOTES

a. Doppler velocity is available only to 230 km and sometimes only to half of that range.

b. A theoretical value is not possible (see footnote letter g of Table 2-1).

c. The estimated median value is skewed to the low end of the maximum range distribution. This is because there are many more relatively weak tornadoes with small diameters. The likelihood of detecting a tornadic vortex signature increases as the diameter and rotational speed increases. Fortunately, the more-intense tornadoes (F3-F5) will typically have tornadic vortex signatures observable to greater ranges. The estimated median range for these cases is near 100 km.

d. Precipitation measurement is discussed separately at the end of the section entitled "Calculated Versus Observed Detection Ranges."

e. Range is not an issue; this is a profile for the immediate vicinity of the radar.

f. The limited observation of thin lines with the WSR-57, WSR-74S, and WSR-74C is believed to be a combination of three factors: (1) display thresholding and large display quantizing intervals; (2) low reflectivity at the top of the thin line combining with partial beam filling; and (3) absence of clutter filters resulting in the loss of the thin line in clutter.

References Consulted: Battan, 1973; Brown et al., 1978; Burgess and Lemon, 1990; Burgess et al., 1993; Burpee, 1986; Carbone et al., 1990; Fabry et al., 1992; Fujita, 1981; Hjelmfelt, 1988; Joss and Waldvogel, 1990; Klingle et al., 1987; Kingsmill and Wakimoto, 1991; Mahoney, 1988; Marks, 1990; Mueller and Carbone, 1987; Pettit, 1990; Wakimoto, 1982; Wakimoto and Wilson, 1989; Weckwerth and Wakimoto, 1992; Wilson, 1975; Wilson and Brandes, 1979; Wilson et al., 1984; Wilson et al., 1994.

- Experience indicates that for all radars the maximum range for detecting the bright band (the horizontally stratified region of enhanced reflectivity) is considerably greater than the calculated value. This is due to the assumption that the bright band could be detected if the half-power beam width were less than the typical 300-m thickness of the bright band. But since the bright band has a peak reflectivity about 9 dB (Fabry and Zawadzky, 1995) or nearly 10 times greater than the echoes above and below the band, it would still be detected when the beam width is larger than 300 m, although it would appear to be of lesser intensity.[1]

While not specifically mentioned in Tables 2-1 and 2-2, radar estimates of precipitation rate and amount are extremely important for flash-flood forecasting, heavy-snow advisories, heavy-rain advisories, and water management of reservoirs and streams. Precipitation rate is directly related to the intensity of the radar returned power; however, the relationship is not absolute and varies in time and space. In addition, the vertical profile of radar reflectivity is affected by precipitation growth, evaporation, and type; thus, the precipitation observed at radar beam height may not be representative of that reaching the ground (Wilson and Brandes, 1979). Consequently, the maximum ranges for estimating precipitation rate or amount will be less than those given for detection in Table 2-2.

Estimates of the maximum range that precipitation can be measured quantitatively are convective rain, 100 to 200 km; stratiform rain, 75 to 150 km; and lake-effect snow, 40-100 km. Provided that suitable precipitation-accumulation software was present on an old network radar, possible degradation in precipitation measurement could occur for locations more than 100 km to 150 km from a NEXRAD that replaced a radar at a nearby location. For snow and rain events with very low melting levels, this range could be less than 100 km. The NEXRAD has automated algorithms for routinely estimating precipitation accumulation. These algorithms represent a major improvement over the rudimentary techniques used with the WSR-57s and WSR-74s.

Hail detection is not specifically listed in Tables 2-1 and 2-2. Although the NEXRAD algorithms show skill in hail detection, little is known about how this type of detection varies with range. Hail could be detected out to ranges of 250 to 300 km; however, it cannot be distinguished from heavy convective rainfall reliably.

COMPARISON OF DETECTION COVERAGE BY PRE-NEXRAD AND NEXRAD NETWORKS

The median values of the maximum detection range for each radar under the "Experience" column of Table 2-2 were used to prepare maps showing national detection coverage for both the pre-NEXRAD and NEXRAD networks for selected weather phenomena. Maps were also prepared indicating those areas where the pre-NEXRAD network afforded better coverage for each phenomenon. (The panel refers to the latter as "difference maps.") The phenomena shown in these coverage and difference maps are hurricanes (Figures 2-2a and 2-2b), supercells (Figures 2-3a and 2-3b), mini-supercells (Figures 2-4a and 2-4b), macrobursts (Figures 2-5a and 2-5b), lake-effect snow (Figures 2-6a and 2-6b), and stratiform snow (Figures 2-7a and 2-7b). Note that boundaries are added to hurricane, lake-effect snow, and stratiform-snow maps to mask-out areas with negligible risk of occurrence of these

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[1] **An extensive analysis of bright bands in the vicinity of Montreal by Fabry and Zawadzky (1995) showed an average value of about 9 dB. This value is similar to that shown by Battan (1973).**

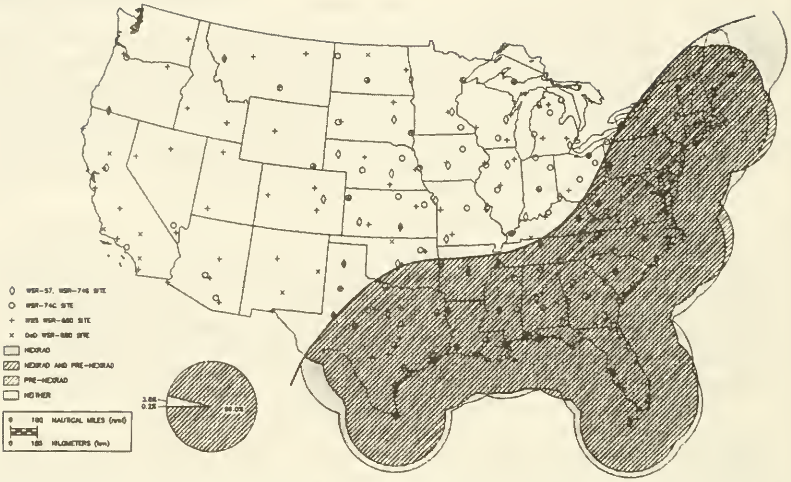

Figure 2-2a Areas of hurricane detection by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and striped-blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans within the marked boundary) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

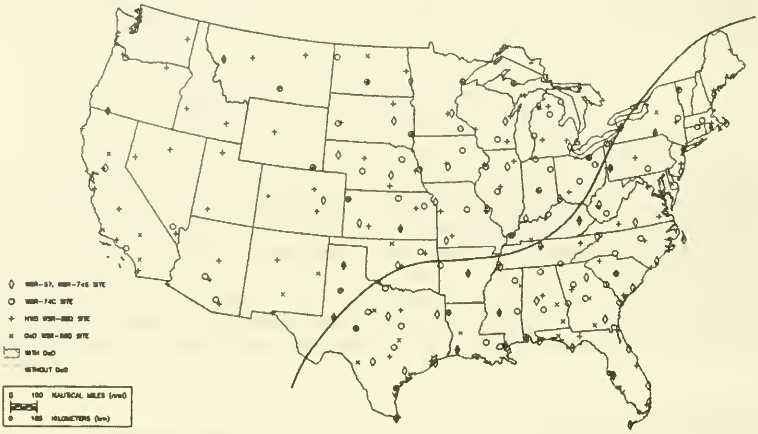

Figure 2-2b Hurricane detection coverage. There are no areas with potentially degraded detection coverage for hurricanes by NEXRAD. The solid black line on each map extending from western Texas to northern Maine marks the boundary of the area under risk from hurricanes from those areas with negligible or no risk. Courtesy of SRI International.

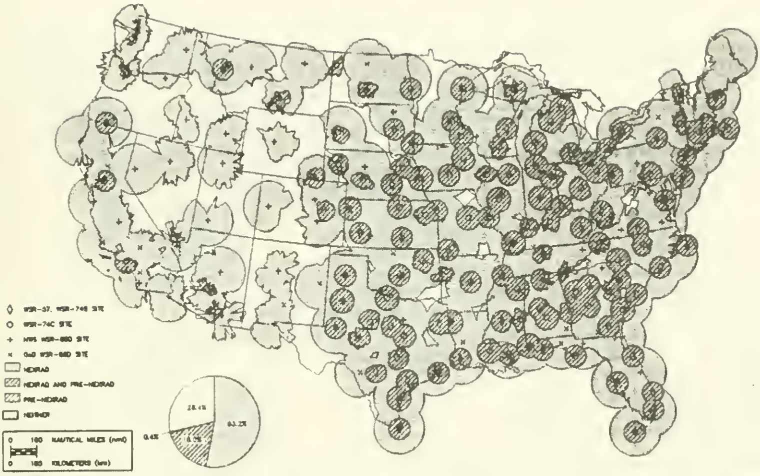

Figure 2-3a Areas of supercell detection by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and striped-blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

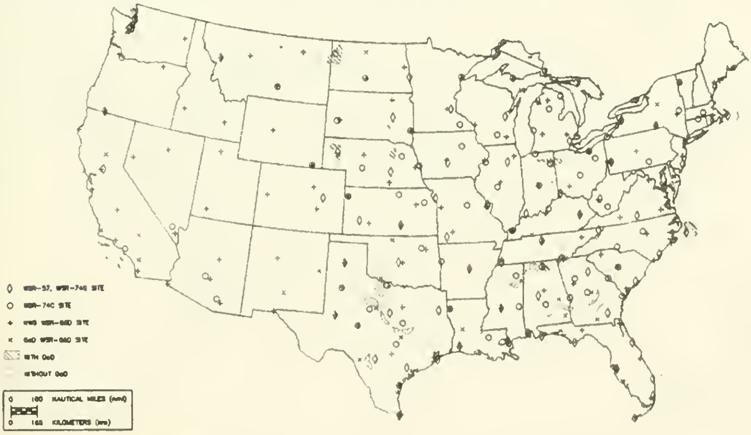

Figure 2-3b Areas with potentially degraded detection coverage for supercells by NEXRAD with DoD (red) and without DoD (blue) NEXRADs compared with the pre-NEXRAD radars. The pre-NEXRAD radars relied on the "hook echo" for supercell detection, while the NEXRAD detects mesocyclone circulation. Courtesy of SRI International.

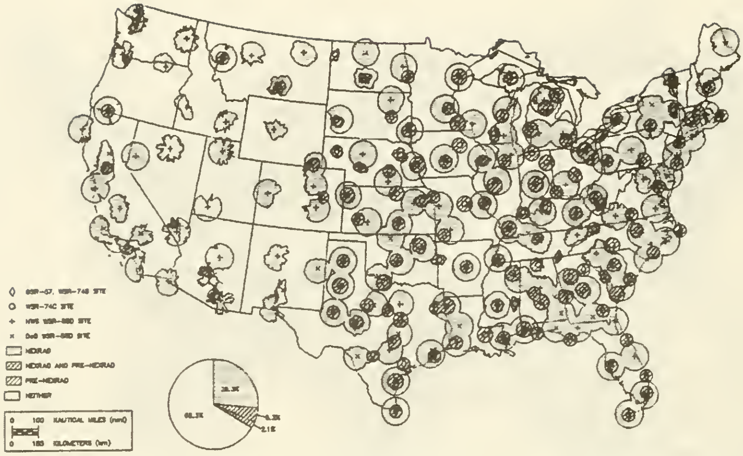

Figure 2-4a Areas of mini-supercell detection by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and striped-blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

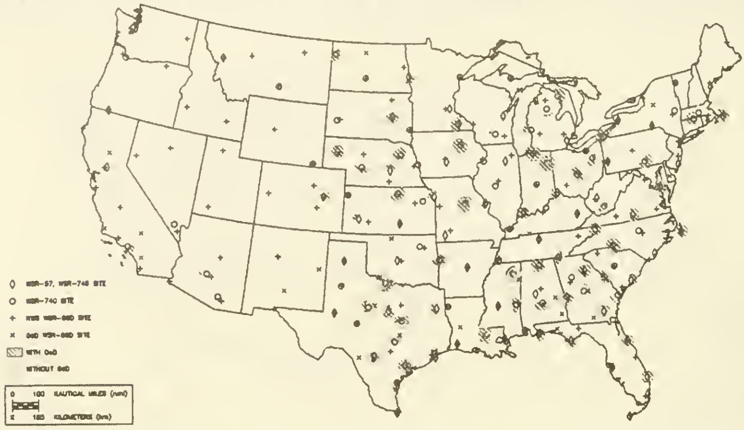

Figure 2-4b Areas with potentially degraded detection coverage for mini-supercells by NEXRAD with DoD (red) and without DoD (blue) NEXRADs compared with the pre-NEXRAD radars. The pre-NEXRAD radars relied on the "hook echo" for mini-supercell detection, while the NEXRAD detects misocyclone or mesocylone circulation. Courtesy of SRI International.

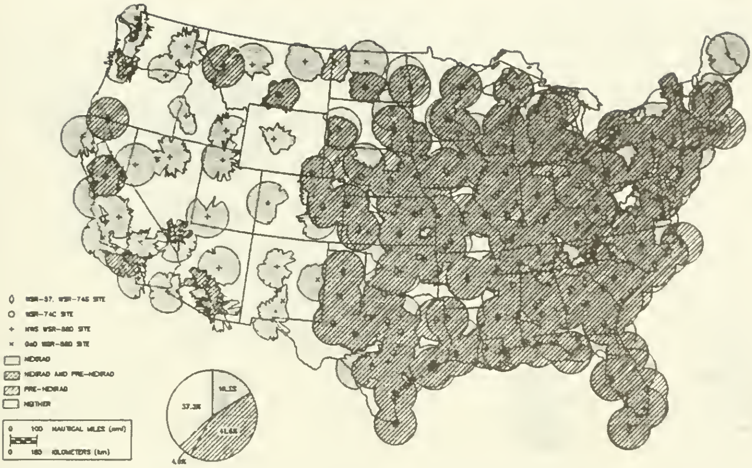

Figure 2-5a Areas of macroburst detection (reflectivity signature) by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and striped-blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

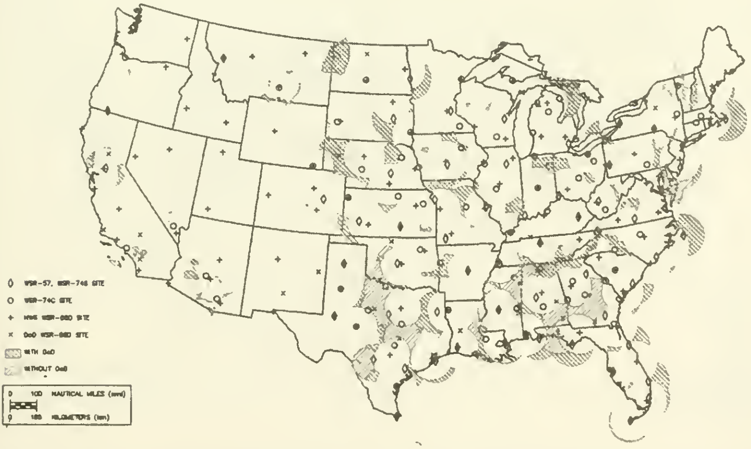

Figure 2-5b Areas with potentially degraded detection coverage for macrobursts (reflectivity signature) by NEXRAD with DoD (red) and without DoD (blue) NEXRADs compared with the pre-NEXRAD radars. Courtesy of SRI International.

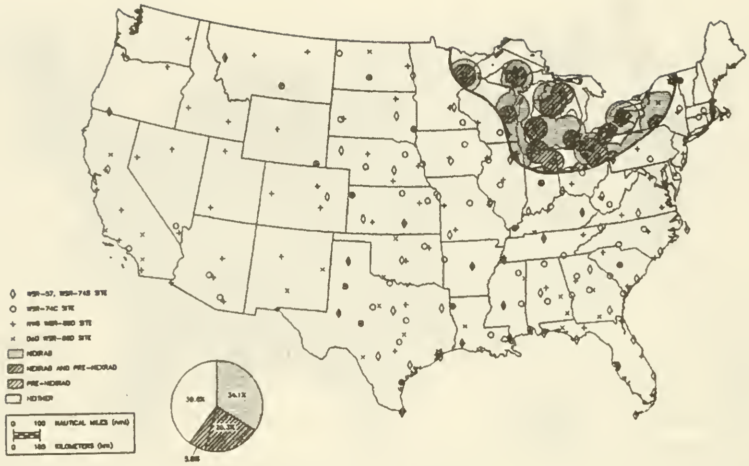

Figure 2-6a Areas of lake effect snow detection by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and stripe- blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States only, within marked boundary) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage for this weather phenomenon. Courtesy of SRI International.

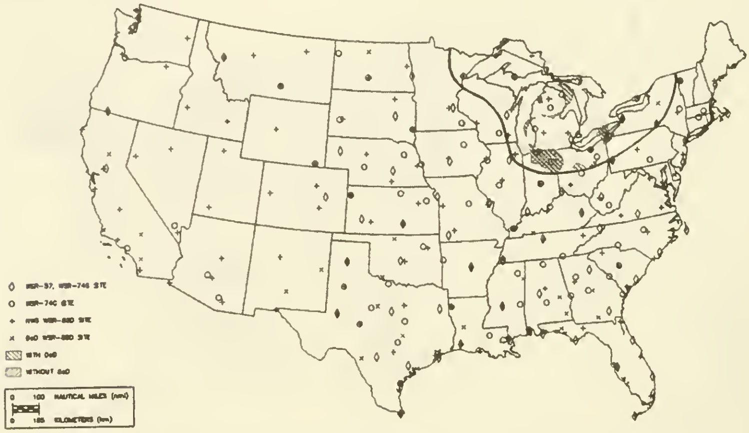

Figure 2-6b Areas with potentially degraded detection coverage for lake effect snow by NEXRAD with DoD (red) and without DoD (blue) NEXRADs compared with the pre-NEXRAD radars. The solid black line marks the boundaries on each map for the areas that have a significant risk of lake-effect snow. Courtesy of SRI International.

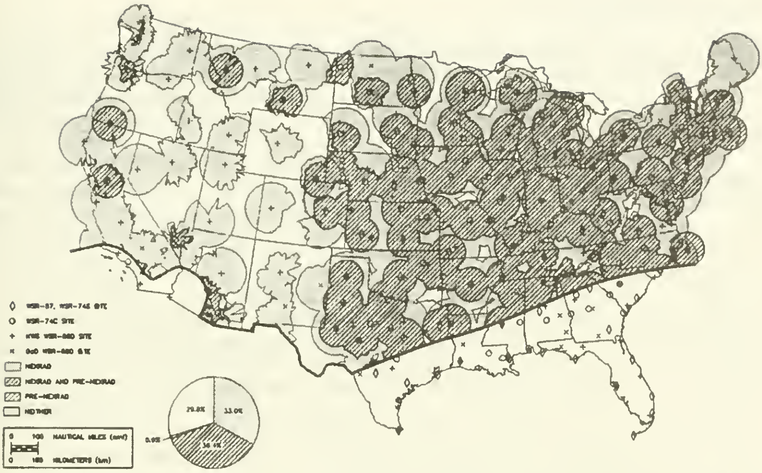

Figure 2-7a Areas of stratiform snow detection by the NEXRAD network and the pre-NEXRAD network. These areas are shown in dotted-red and striped-blue backgrounds, respectively. The coverage extent of each individual radar in the two networks is taken from the median values of the "experience" maximum range values from Table 2-2. The pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans within boundary lines shown) where only the NEXRAD network provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provides coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

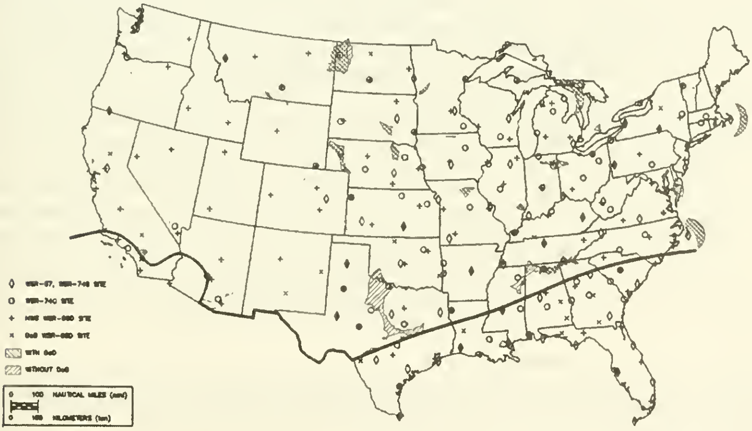

Figure 2-7b Areas with potentially degraded detection coverage for stratiform snow by NEXRAD with DoD (red) and without DoD (blue) NEXRADs compared with the pre-NEXRAD radars. The solid black line marks the boundaries on each map for the areas with a significant risk of stratiform snow occurring. Courtesy of SRI International.

phenomena. With the exception of convective rain, stratiform rain, and melting level,[1] the other phenomena in Table 2-2 either were not detectable by the old network or were only marginally detectable. In the case of stratiform and convective rain, the detection (not quantitative precipitation measurement) range for all the radars is so large that there are no locations over land where the old network had better detection capability.

It is quite apparent from a cursory visual scan of these 12 maps that the NEXRAD network greatly increases the total area over which these phenomena can be detected. The hurricane coverage maps show full coverage by NEXRAD for areas of risk. However, for the rest of the significant weather phenomena, there are some areas where the pre-NEXRAD network had better coverage. A few such areas appear in Figure 2-3b, which shows supercell detection. There are more areas where the old network could detect mini-supercells (Figure 2-4b) or macrobursts (Figure 2-5b) and the NEXRAD network will not. These are mostly locations that were near pre-NEXRAD radars but are more distant from the nearest NEXRAD or planned NEXRAD. For example, Table 2-2 indicates that a mini-supercell that is more than 100 km from a NEXRAD but within 45 km of a WSR-57 would be more likely to be detected by the WSR-57 (beam resolution and smoothing of Doppler velocity structures are key factors). It is this type of location that is evident in Figure 2-4b. Unfortunately, no definitive experiments have been carried out to indicate that this actually would be the case. Because of the limitations in using the bow-echo feature for macroburst detection, as discussed earlier, it is not clear whether detection by the pre-NEXRAD radar in these cases gave better service; the detection often was not timely enough to give adequate warning.

The coverage areas in the figures are based on estimated median maximum range values from Table 2-2. It should again be emphasized that there is considerable variability in these maximum range values, as indicated by the numbers within the brackets in Table 2-2. Small changes in the maximum range values used to prepare Figure 2-4 and the other maps could easily eliminate or add areas where the pre-NEXRAD network had better coverage. An example is provided by Figure 2-8a, which shows (in comparison with Figure 2-3a) how radar-detection coverage changes when maximum detection range (i.e., "experience") values are used for supercell detection. The corresponding difference chart in Figure 2-8b shows that the potentially degraded areas of supercell detection coverage by NEXRAD for the contiguous United States are reduced substantially when the maximum NEXRAD capability threshold is used. Rather than using any of these figures to label areas where the pre-NEXRAD network provided better coverage, the panel believes that it is preferable to use these figures in a relative sense. Thus, those areas identified in the figures as having detection coverage by the pre-NEXRAD network and not by NEXRAD are areas where radar-detection coverage is *more likely* to be degraded than in other areas.

Where there is a one-for-one replacement of an old radar by a NEXRAD, radar-detection capability will unquestionably be improved. Degradation of detection capability might occur where the pre-NEXRAD radar is decommissioned and coverage is provided by a NEXRAD located some distance away. Appendix F shows the distance of the nearest NEXRAD from each of the pre-NEXRAD radars.

Following are examples of areas shown in Figures 2-2 through 2-7 in which radar-detection capability for one or more phenomena is likely to be degraded with the NEXRAD network. The order of locations discussed below is alphabetic by state. The order does *not* imply priority.

Northern Alabama (e.g., Huntsville vicinity)

This area currently has a WSR-74C Doppler weather radar and is slated to be covered by a NEXRAD located 164 km away. As a consequence of the large increase in distance of this area from the new NEXRAD radar, radar detection of smaller-scale, low-altitude weather phenomena (i.e., mini-supercells, tornado vortices, macrobursts, and microbursts) and of precipitation reaching the ground (important for flash-flood warnings) may be significantly degraded.

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[1] Altitude at which ice/snow melts.

Northern Indiana (e.g., Fort Wayne, South Bend vicinity)

A DoD NEXRAD at Grissom Air Force Base was planned, but this NEXRAD was eliminated when the base closed. As a result, radar-detection capability for a number of weather phenomena that occur in this region (e.g., supercells, mini-supercells, lake-effect snow, macrobursts, and stratiform snow) may be degraded when existing radars are decommissioned.

Northwest North Dakota (e.g., Williston vicinity)

The existing radar site for this area is the most distant (207 km) from a NEXRAD installation of any of the pre-NEXRAD radars that will be decommissioned. The locally occurring weather phenomena whose radar-detection capability may be degraded include stratiform snow, supercells, and macrobursts. The state of North Dakota is currently sponsoring work in hail suppression in a portion of the potentially degraded radar-detection coverage area which is identified in Figure 2-3b (top center of map).

Northwest Pennsylvania (e.g., Erie vicinity)

This area has a region-specific, low-altitude weather phenomenon (lake-effect snow) that is difficult to detect with NEXRADs located at Cleveland, Ohio; Buffalo, New York; and Pittsburgh, Pennsylvania. The pre-NEXRAD radar in this region was able to detect lake-effect snow within approximately 110 km of the existing radar site. Other locally occurring low-altitude phenomena that may have degraded radar-detection coverage include mini-supercells and macrobursts.

Southeastern Tennessee (e.g., Chattanooga vicinity)

Radar-detection capability in this area for low-altitude phenomena (e.g., mini-supercells and macrobursts) and even supercells is difficult to achieve at even moderate ranges from a NEXRAD due to the complex terrain features. Figures 2-3 through 2-5 show that the area covered by the existing pre-NEXRAD radar in this location is, itself, significantly limited by the topography.

The difference maps also make it evident that there are 15 DoD NEXRAD sites (the striped blue areas in Figures 2-2b through 2-7b) that cannot be considered "supplemental."[1] These sites provide the only detection coverage of certain phenomena in their area of coverage. Without these 15 radars, there would be more geographic regions in the contiguous United States where radar-detection capability may be degraded.

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[1] These 15 NEXRAD sites are East Alabama, Alabama; Beale and March, California; Dover, Delaware; NW Florida, Florida; Moody and Robins, Georgia; Ft Polk, Louisiana; Columbus, Mississippi; Minot, North Dakota; Frederick and Vance, Oklahoma; Central Texas, Dyess, and Laughlin, Texas. There are five additional DoD NEXRAD sites that provide sole coverage for areas that were not covered by the pre-NEXRAD network. These are Edwards and Vandenberg, California; Cannon and Holloman, New Mexico; and Griffiss, New York.

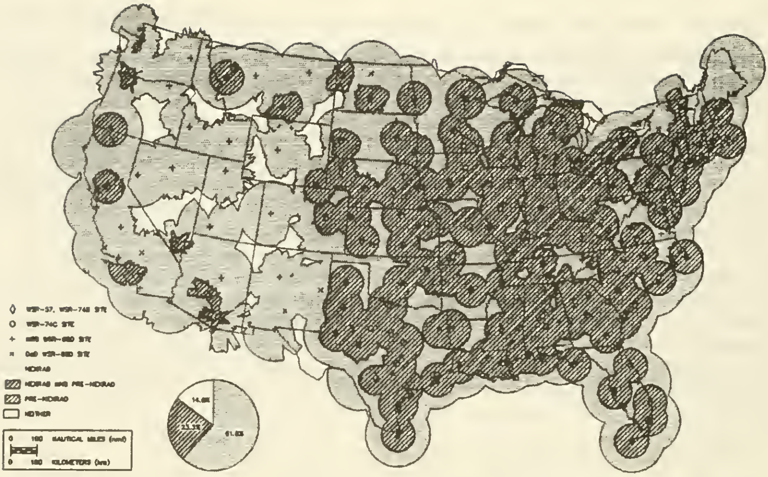

Figure 2-8a Maximum range detection coverage of supercells for the pre-NEXRAD (blue) and NEXRAD (red) networks. The coverage extent each individual radar in the two networks is taken from the higher values of the "experience" median maximum range values from Table 2-2. T pie chart shows the percentage of vulnerable areas (contiguous United States + 230 km across borders or oceans) where only the NEXRAD netwo provides this coverage (dotted red), where both networks provide coverage (combined red/blue), where only the pre-NEXRAD network provid coverage (striped blue), and where neither network provides coverage (white) for this weather phenomenon. Courtesy of SRI International.

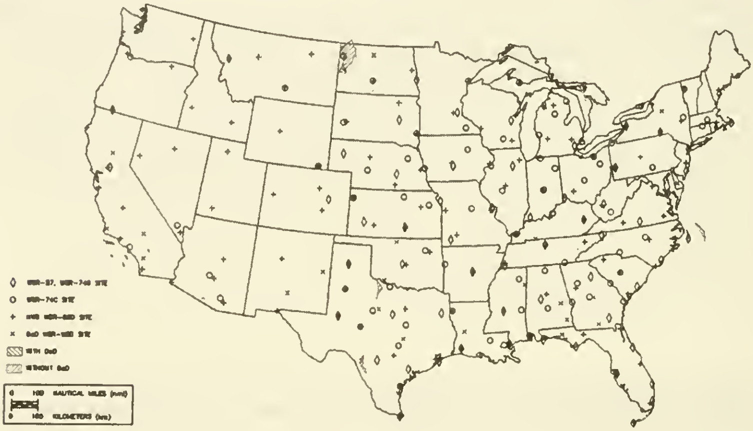

Figure 2-8b Areas with potentially degraded detection coverage for supercells by NEXRAD with (red) and without (blue) DoD NEXRADs compare with the pre-NEXRAD radars. Courtesy of SRI International.

IMPACT OF NEXRAD COMMUNICATIONS LINKS AND FORECAST OFFICE STAFFING

In generating NEXRAD radar-detection coverage information for Figures 2-2 through 2-7, the panel assumed that data from the closest NEXRAD radar to each location are available to the cognizant WFO. When the cognizant WFO is not located near the NEXRAD radar product generator (RPG), the products to be displayed on the WFO's principal user processor (PUP) must be provided over a telephone line. Full-capability access is provided by a 56-kbs communications line. Full-capability access is also needed for the four forecast offices that will provide service using two NWS NEXRADs to cover an extended service area.[1]

Coverage by the 15 DoD NEXRADs referred to previously is needed as part of the overall national detection coverage for significant weather. Currently, these NEXRADs are slated to have only a 9.6-kbs communications capability to the area WFO that provides warnings to the public. Additionally, there will be delays in providing certain products to a remote user. The consequence is that the effective radar-detection capability during significant weather, as perceived by the cognizant WFO, may be degraded due to inadequate communications and back-up capabilities. The panel has not quantified this potential effective degradation in radar-detection capability. However, this is an important issue that needs to be addressed immediately by the NWS through tests at a WSFO in conjunction with the supporting DoD radar (e.g. Norman, Oklahoma, operating in conjunction with the DoD NEXRAD at Frederick, Oklahoma).

The effective radar-detection capability of a NEXRAD depends on the skill and attentiveness of the forecaster using the PUP. Therefore, it is essential that WFOs using two NEXRADs to cover their extended service area have adequate staffing during significant weather to analyze the data from both radars, and from neighboring radars, and to issue timely forecasts and warnings for their entire extended area of responsibility. This issue needs to be addressed by the NWS (e.g., as a part of the Modernization and Associated Restructuring Demonstration (MARD) activity) through their use of assessment criteria to resolve degradation-of-service issues in areas of public concern.

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[1] These offices are Phoenix for Yuma, Arizona, NEXRAD; Miami for Key West, Florida, NEXRAD; and Portland for Caribou, Maine, NEXRAD, which are a consolidation of two former service areas; and Salt Lake City for Cedar City, Utah, NEXRAD, whose service area does not change.

3

Comparison of Weather Services: Pre-NEXRAD and NEXRAD

In the preceding sections, and in Appendix A, the panel examined the technical aspects of the pre-NEXRAD and NEXRAD radars as well as their calculated and "experienced" detection capabilities. This section discusses the panel's comparison of the actual weather services provided by the old and new systems as a final approach to determining whether the implementation of the new system could result in a degradation of service to the nation.

It is important to consider the effect of other, nonradar elements of the nation's overall weather infrastructure on the NWS's ability to provide service. It is also important to consider the impact that nearby radars in the network will have on enhancing the service provided to each service area. Another key aspect of the comparison is the performance of both the old and new systems in detecting severe weather events and generating accurate, timely warnings. New technologies in Doppler signal processing, digital information systems, and color displays in the NEXRAD system contribute to the development of new products and services. These technologies are described and discussed in Appendix A.

COMPOSITE SYSTEM CONSIDERATIONS

The composite system is a combination of scientific, technical, and staff resources that are organized by the NWS to accomplish its mission of providing weather forecast and warning services, primarily for the protection of life and property. These resources include all of the weather data that are collected, processed, and analyzed; specialized equipment; dedicated communication networks and systems; centralized operation of supercomputers and numerical models; and highly trained staff. Detailed information about the composite system can be found in an earlier report by the NRC's NWSMC (NRC, 1994b).

Weather services provided to all users, including the public, are made available through a complex array of observations and models and through the interpretive skills of experienced forecasters. In the modernized NWS, there will be a host of new observational systems available to weather forecasters. These will include

- the NEXRAD network;
- the ASOS, which continuously provides surface observations of temperature, wind, humidity, pressure, and other atmospheric variables;
- the next generation of geostationary and polar-orbiting satellites; and
- a national lightning network.

In addition to these systems, there are a number of new observational systems that are currently being demonstrated or developed for future use. These systems include

- commercial aircraft measurements of wind and temperature, and possibly humidity, both at flight levels and during ascent and descent in the vicinity of larger airports;
- wind profilers that measure horizontal winds as a function of height above the ground; and
- the next generation radiosonde system.

Operational components of the composite system are shown in Figure 3-1. As shown in the figure, each WFO will have responsibility for what might be viewed as a cylindrical volume of coverage in the United States. These volumes are generally overlapping or contiguous, allowing the WFOs to benefit from one another due to the availability of network data from adjacent regions and nationally. The AWIPS is the critical component for the system because it brings together all of the information for use by the forecasters, as discussed in the following section.

The composite system of observation coverage will reside within a substantially restructured weather service that will include the following components:

- WFOs located near NEXRADs;
- RFCs collocated at WFOs;
- WFOs located on or near university campuses; thereby enhancing the interactions among forecast office staff, university faculty members, and students;
- a Science Operations Officer, on each WFO staff, who will be responsible for the development of new forecasting techniques; and
- WFO staff specially trained in modern forecasting techniques and newly emerging techniques.

As in the past, the composite system is also augmented substantially by such things as experienced local spotter and cooperative observer networks, hydrometeorological instrumentation that supports the work of the WFOs and the RFCs; and highly skilled forecasting staff who consider local geographical characteristics in their day-to-day forecasting responsibilities. These local characteristics might include terrain effects that produce elevated heat sources and are, therefore, preferred regions for thunderstorm development.

The NWS will use the MARD over the central United States to verify and test the composite system after all components are in place. The results of MARD should not be generalized to other geographical regions of the country due to differences in area weather and other factors.

Comparison of the full spectrum of services of the modernized NWS and of the past generation of weather services will be impossible to quantify convincingly until all components of the new system have been installed.

NETWORK CONSIDERATIONS

In a series of developments extending from the early 1970s into the early 1980s, the NWS provided some NWS offices with a computer-based system for processing radar-generated digital reflectivity data into products that forecasters could use directly (Wilson, 1970; McGrew, 1972; and Devore, 1983). This system, known as the radar data processor (RADAP II), ultimately was available at 12 locations. At six of these sites, an interactive color radar display (ICRAD) capability provided

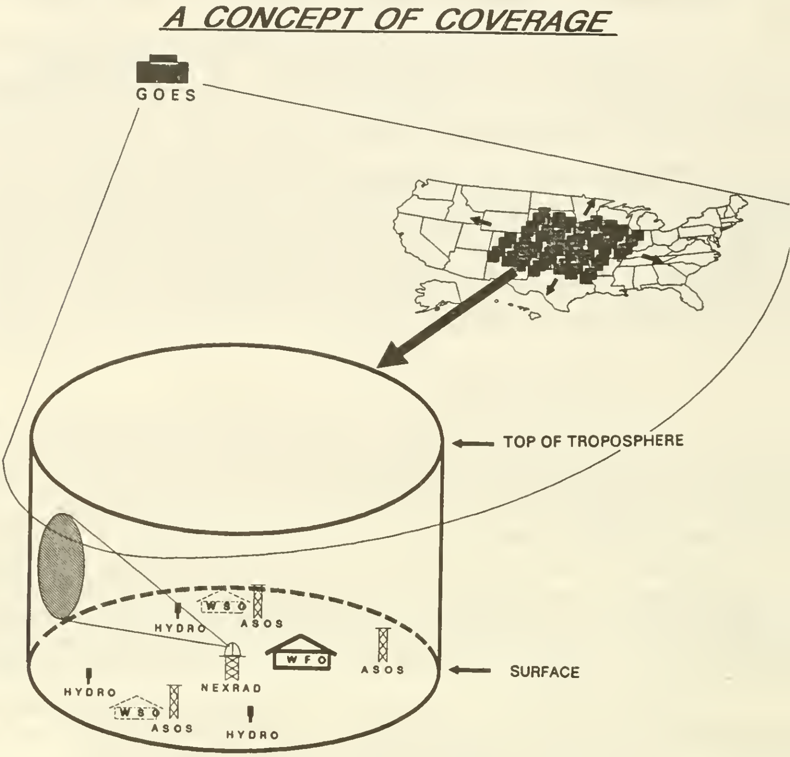

Figure 3-1 National Weather Service concept of observation coverage when the modernization is fully implemented. Courtesy of NOAA/NWS.

a color-map presentation of radar reflectivity data and derived products. ICRAD also made it possible to view the RADAP II products at a remote location.

Although NWS forecasters experienced occasional hardware and software problems, the RADAP II operations were considered a success. This capability gave both forecasters and researchers valuable pre-NEXRAD experience. Most of the radars at RADAP II sites were either directly replaced by NEXRADs, representing a clear improvement of both detection and algorithm capabilities, or were decommissioned following the installation of a NEXRAD nearby. The prior existence of RADAP II capability or an ICRAD display of products from a neighboring RADAP II radar is one of the factors NWS should consider when assessing possible degradation of service at a specific location.

While the NEXRAD network is being installed, an internal communications system is being used to distribute the "hourly digital precipitation array" of 2 km and 4 km data. In addition, the "radar coded message" from each NEXRAD site is being sent to the National Severe Storms Forecast Center in Kansas City, Kansas, to generate a national mosaic product. The NEXRAD information dissemination service providers (Baer, 1991) also offer a national mosaic radar reflectivity product that is widely used in the commercial sector and in government, including the National Meteorological Center and the National Severe Storms Forecast Center.

The NEXRAD system allows forecasters at each WFO to access some radar products from several neighboring radars. This information will be very important for observing and tracking significant weather as it approaches the WFO's primary geographic area of responsibility. This wider-area picture of the weather will provide information about the surrounding environment within which the WFO's primary responsibility lies. Some WFOs have multiple, associated principal user processors (PUPs), and others may obtain additional radar information for their area of coverage through the use of nonassociated PUPs. In the four locations with two associated PUPs, high-speed communications are provided to each radar product generator (RPG), and each PUP functions in an identical manner. The nonassociated PUPs have access to any NEXRAD, but this access is through a low-speed, dial-up communication line, and WFOs can receive products only on a by-request basis. WFOs that require data from DoD NEXRADs for part of their service area have access only through low-speed lines.

The NWS has instituted a continuing evaluation and upgrade program for the NEXRAD at the Operational Support Facility in Norman, Oklahoma. This facility is an essential element of the national network that will ensure that the associated services will improve over time.

In the modernized NWS, AWIPS will provide interactive analytical capability, of which NEXRAD will be a part. This capability will assimilate data from satellites, surface instruments and human observers, lightning detection networks, radiosondes, and commercial aircraft, along with data from radars and from numerical models run at national centers. Forecasters will use this data base to evaluate the state of the atmosphere and to produce short-term warnings, "nowcasts," and forecasts of weather in support of public safety and other needs.

The panel emphasizes the need and importance for NWS to complete the modernization (including AWIPS) in a timely manner to avoid added risks of degraded coverage and service due to a prolonged transition to new technology.

WARNING PERFORMANCE

The overall performance of a system in producing forecasts, advisories, and warnings is an important criterion for evaluating the adequacy of radar coverage with respect to degradation of service. Most of the available data on the performance history of the pre-NEXRAD system concerns the warning function. Although radar is not the only source of data on which storm warnings are based, it tends to play a principal role.

Evaluation of warning performance requires data on warnings issued and on actual storm events, regardless of warnings issued. A warning is issued by the NWS for a particular county, or set of counties, for a specific period (generally 30-60 minutes). The warning is then logged systematically by the National Severe Storms Forecast Center. Data on storm events are accumulated and published periodically in *Storm Data*. When the NWS presented its analyses of verification data to this panel, the panel noted that the historical storm data, in particular, are not as comprehensive as would be desired for rigorous scientific analysis. The panel is encouraged by NWS efforts to collect more comprehensive storm reports as spotter networks and other networks in county warning areas are expanded and realigned to NEXRAD-equipped weather offices.

The NWS customarily uses two measures to evaluate performance: the probability of detection (POD), which in this context refers to the fraction of storm events for which warnings were issued; and the false alarm ratio (FAR), which refers to the fraction of warnings where a storm did not occur. A warning system that was functioning well would have a high POD and a low FAR.[1] Warning performance exhibits considerable variation from station to station and from year to year for reasons that involve factors other than the radar performance. In addition to ordinary random variations, these reasons include both human factors and the performance of other components of the composite system, the storm climatology of the area, and the time of day of storm occurrence. The POD and FAR statistics represent ratios, and, during the panel's consideration of those ratios, concerns were raised about the methodology used to determine whether storms occurred or were reported. Therefore, the panel found it necessary to examine the number of warnings and reported storm events in addition to the POD/FAR statistics.

The panel used information on weather fatalities as one gauge of storm severity for various phenomena. Data on natural-hazard deaths in the United States show that in 1992 and 1993 the primary causes of severe-weather fatalities include flash floods, lightning, and tornadoes, in that order. (NWS, 1993 and 1994). These fatality statistics were consistent with similar statistics gathered over 30 years.

Early Experience with NEXRAD

Several of the NEXRADs have been in service long enough to provide preliminary data on storm-warning performance (Polger et al., 1994; Maddox and Forsyth, 1994). Figure 3-2 shows severe storm warning statistics for six field offices. The POD and FAR statistics have been plotted versus time in years for each of these sites. The statistics shown for the early years represent the pre-NEXRAD era; those for later years indicate PODs and FARs after installation of a NEXRAD at each location. In all cases, POD and FAR performance has improved with the introduction of the new technology. Figure 3-2 also shows that, in general, the number of warnings issued since the advent of NEXRAD has increased. With more warnings being issued and a higher fraction of them being verified, as indicated by the lower FAR, it is clear that better service is being provided to the areas served by the NEXRAD-equipped NWS offices. At the same time, the overall increase in the number of reported storm events makes any attempt at quantitative comparisons difficult.

It is unlikely that the actual incidence of storms has shifted upward since the advent of the NEXRAD. The increase is probably due to a more vigorous verification program, involving greater

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[1] The current verification system considers a storm to be covered by a warning, or a warning to be verified, if a reported storm occurs within an area and time period covered by the warning. Some warnings issued after a storm is already in progress are considered as verifications but only if the NWS received another report *after* the warning is issued.

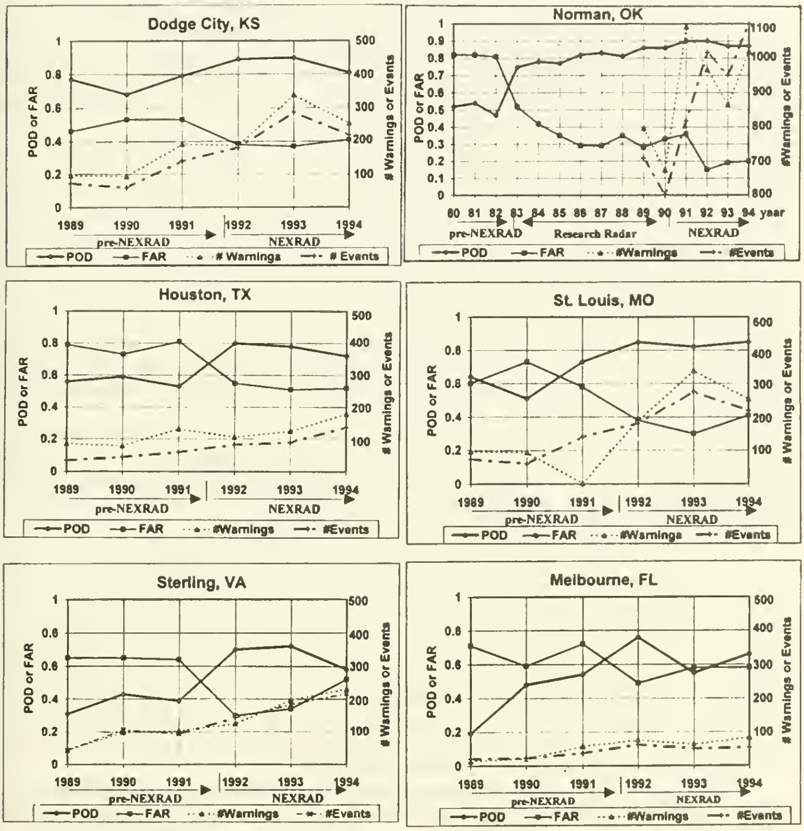

Figure 3-2 History of severe-storm probability of detection and false-alarm ratio at six field offices before and after installation of NEXRAD. Also shown are the annual number of warnings and reported storm events. The 1994 data are preliminary and still undergoing validatioo checks by NWS. In the case of Norman, Oklahoma, an experimental Doppler radar was used operationally beginning in 1983. Courtesy of NWS.

efforts to ascertain the presence of severe storms in the warning areas (e.g., by more phone calls to spotters). However, a more vigorous verification program, with no change in the radar or in the number of warnings, would produce similar changes in the POD/FAR statistics by converting some would-be false alarms into verified warnings. Thus, the trends in the POD/FAR statistics represent some indeterminate combination of improvements in the warning services and enhancements in the verification program.

Figure 3-3 shows POD and FAR statistics as a function of distance from NEXRADs to the centers of the served County Warning Areas for the same six sites shown in Figure 3-2. The corresponding numbers of warning and reported events per unit area for the 2 years are also shown in the figure. These data, which are intended to illustrate the warning performance as a function of distance from a NEXRAD, reflect some puzzling features. For most of the sites, the PODs and FARs are relatively constant with increasing range. Yet, in most cases, the number of warnings per unit area decreases with increasing range. Based on discussion of radar-detection capabilities in Chapter 2, one would expect fewer storm detections at longer ranges. Moreover, if radars were the major factor in the warning process, there should be fewer warnings at longer ranges, as is usually the case. But with fewer warnings, one would expect more missed detections and, consequently, a lower POD, in contrast to the pattern found in several cases. The reasons for these seemingly contradictory indications, and for the increase in warnings per unit area with distance from the Melbourne NEXRAD (see Figure 3-2), are not clear.

There is no apparent reason why the number of storm events should vary in any systematic way with distance from a radar. Yet, in most cases, the number of reported events decrease with increasing range. This reflects some kind of nonuniformity in the verification data, perhaps due to variations in population density or in the spotter networks. Such nonuniformity makes it difficult to evaluate the effect of range on warning performance with any confidence.

Furthermore, in each case, the number of warnings and reported events per unit area seem to be closely related. A similar correlation is evident in Figure 3-2. This correlation suggests some kind of coupling, either direct or indirect, between the issuance of warnings and the reporting of storm events. The panel has been unable to account for this relationship and is concerned that it clouds the picture with respect to the effect of distance from a radar on warning performance. The panel was unable to resolve these complicating factors, which need to be examined further in future studies. Degradation of service evaluations for specific sites will require NWS to demonstrate that a county that is distant from a NEXRAD and associated WFO will receive, as a minimum, the same quality of warning service that was provided by the existing, nearby office in the past. That is, the new office's performance must be compared against that of the existing office that is equipped with a radar with pre-NEXRAD capabilities and pre-modernization components.

Figure 3-4 shows the results of an independent study on tornado warning lead times (Bieringer and Ray, 1995). As indicated by the figure, there is a clear and substantial improvement after NEXRAD technology is made available to forecasters. Polger et al. (1994) also analyzed the comparative performance of the NEXRAD and pre-NEXRAD eras for flash-flood warnings. The relevant data for flash-flood PODs and FARs for five sites are shown in Figures 3-5a and 3-5b. Substantial improvements are seen at all locations, with the exception of Norman, Oklahoma. There may be several reasons for this anomaly. First, it may be that even in the pre-NEXRAD era Norman and Oklahoma City forecasters had access to data from better experimental radar equipment with computer processing capabilities (Maddox and Forsyth, 1994). Second, special flash-flood forecast and warning procedures were in place in the pre-NEXRAD era. In addition, the pre-NEXRAD staff were thoroughly trained, and strong management-support practices were in effect.

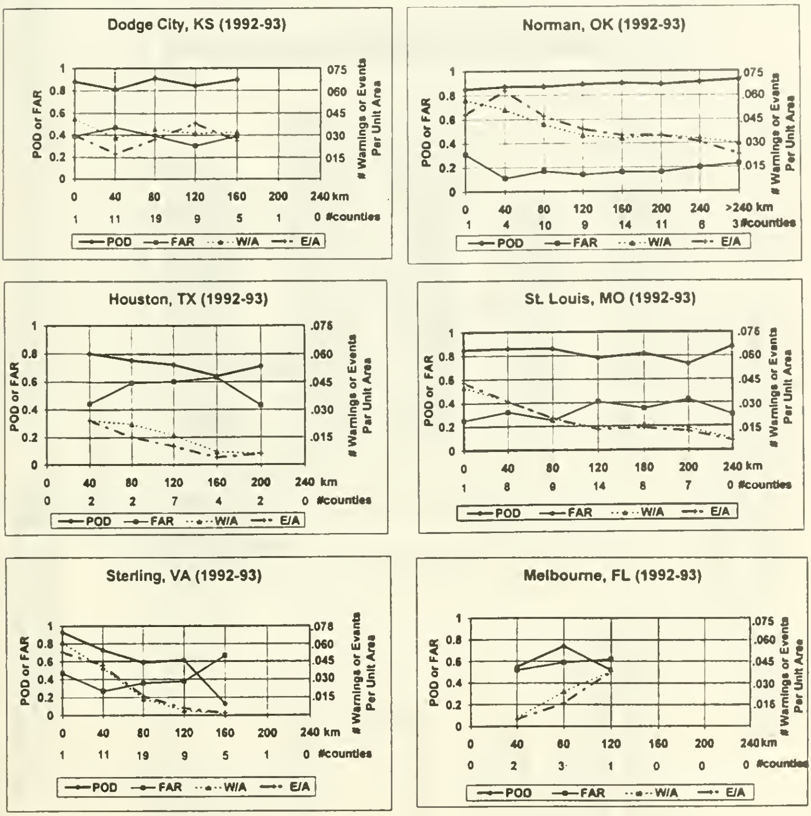

Figure 3-3 Probability of detection, false alarm ratios, and number of warnings and events per unit area for 1992 and 1993. These data are shown with distance from the NEXRAD for the same six field offices depicted in Figure 3-2. Courtesy of NWS.

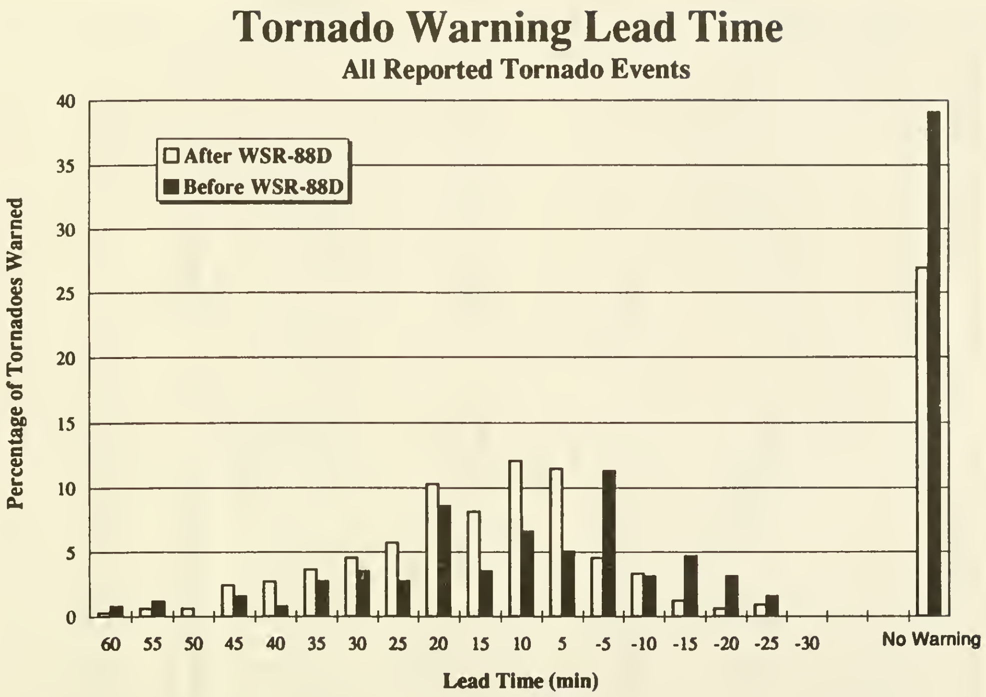

Figure 3-4 Comparison of lead times for tornado warnings obtained after (open) and before (shaded) NEXRAD data became available. The average lead time for all tornadoes increased from 8.0 minutes (before NEXRAD) to 13.0 minutes (after NEXRAD). The percent of tornadoes receiving a warning before touchdown increased from 61 percent (before NEXRAD) to 73 percent (after NEXRAD). Source: Bieringer and Ray, 1995. Reprinted with permission.

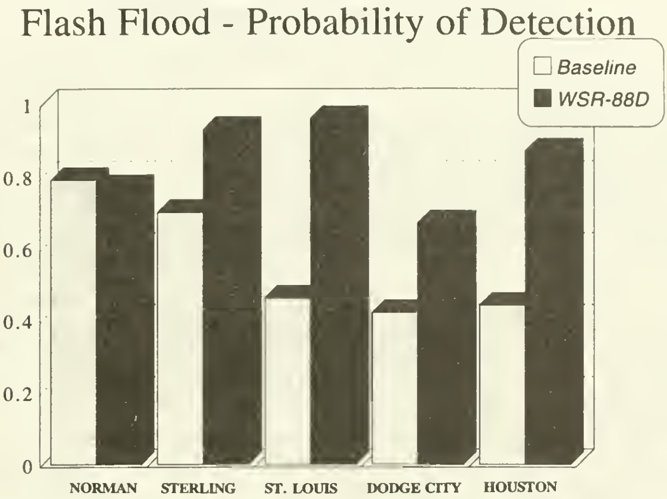

Figure 3-5a Comparison of flash-flood probability of detection prior to NEXRAD (baseline) and with NEXRAD for five field offices. Courtesy of NWS.

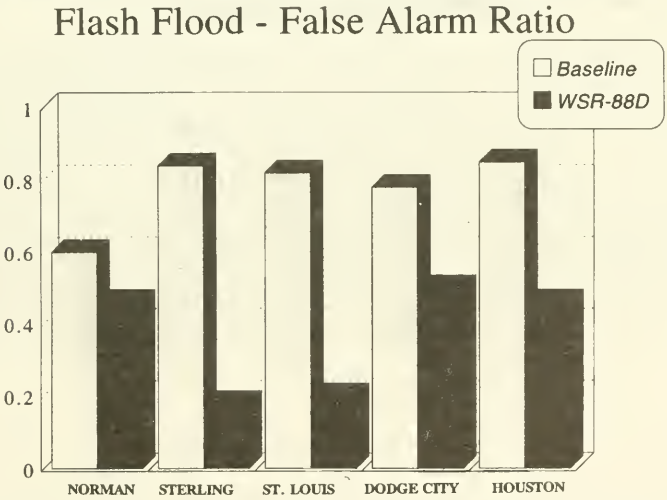

Figure 3-5b Comparison of flash-flood false-alarm ratios prior to NEXRAD (baseline) and with NEXRAD for the same five field offices. Courtesy of NWS.

Comments and Conclusions on Warning Performance

It is apparent that warning performance at all locations analyzed by the panel has improved substantially with the introduction of NEXRAD. PODs, FARs, and lead times for tornadoes and flash floods have also improved significantly. It is reasonable to expect that performance will improve further as forecasters gain additional experience with the system, forecasting methods are streamlined, and algorithms are refined. This general result is consistent with what would be expected from the information found in the tables and coverage maps in Chapter 2.

Even though many of the early NEXRAD sites had specially qualified staff, the panel is confident that overall increases in warning performance are likely at all sites. This improvement will stem from the use of the new technology, the extensive training provided to all the NEXRAD operators, the sharing of lessons learned within the NEXRAD community, the continuing development efforts of the Science Operations Officers and the Operational Support Facility, and similar efforts.

The data regarding warning performance as a function of distance from a NEXRAD site present a more mixed picture. In all likelihood, the warnings and storm reports for the more distant locations concern mostly larger and more intense storms. If further study shows that smaller and less intense storms are less likely to result in warnings and storm reports from a NEXRAD that is more distant from them than a nearby, older radar would be, then this effect of distance may result in a degradation of these particular services at some locations.

In the panel's judgment, insufficient data currently exist to permit definitive conclusions to be made. Although the early results are very promising, further testing in the MARD and at diverse geographic locations will be necessary to draw more general conclusions regarding the quality of weather warnings as a function of distance from the radar.

The panel concludes with confidence that the introduction of NEXRAD will significantly improve overall storm detection and warning performance.

4

Guidelines for Assessing Possible Degradation of Service in Specific Areas

The panel conducted an assessment of the adequacy of NEXRAD coverage *for the nation* in terms of the "no degradation of service" requirement imposed by the Weather Service Modernization Act. Accordingly, the panel examined the relative capabilities of the pre-NEXRAD and NEXRAD systems on a national level. In the course of this analysis the panel identified some geographic areas where there appears to be a potential for degraded radar-detection coverage with the new system. However, the panel deliberately *did not* attempt to make specific determinations as to the possible degradation of service at particular locations; nor did it conduct a site-by-site investigation of the possible need for additional radars.

As discussed in previous sections, *service* is a much more complex and subjective matter than radar-detection coverage. Many factors, apart from technical considerations, enter into decisions regarding the need for additional radars, including budgets, congressional interests, pressure from the public, and similar input. It is beyond the panel's purview to make such determinations; however, these factors, as well as economic vulnerability and impacts, are important and should be considered by the NWS. The panel recognizes that the NWS will be pressed to make such determinations with regard to specific sites as the modernization progresses. The public concerns discussed in the following section reflect these kinds of site-specific issues. A set of general criteria are provided in Chapter 4 under "Assessment Criteria and Procedures." These criteria can be used to assess possible degradation of service in particular locations and to determine whether additional radars are warranted.

CONSIDERATION OF PUBLIC CONCERNS

Concern about possible degradation of services in the course of the NWS modernization program has generated considerable public comment. In accordance with a *Federal Register* announcement of November 4, 1994, the NWS received comments from approximately 67,000 people in the form of letters, postcards, collections of information, and signatures on resolutions and petitions. About 65,000 of these people (largely from 3 areas) signed petitions or sent form postcards as part of organized efforts to obtain additional NEXRAD coverage for their communities. In contrast, of the approximately 1,800 individually formulated letters and postcards, most (90 percent) commented on the need for continued services from their local weather office. About 10 percent provided technical data or other information about deficiencies in radar coverage that might be encountered when an existing radar was decommissioned and the coverage for an area would be provided by a NEXRAD relatively distant (usually 80 or more miles) from their community. Figure 4-1 shows the 32 areas of the nation from which public comments were received. Comments from 15 areas (solid circles) were concerned primarily with the planned closure of a local weather office. The other 17 areas (the open circles and

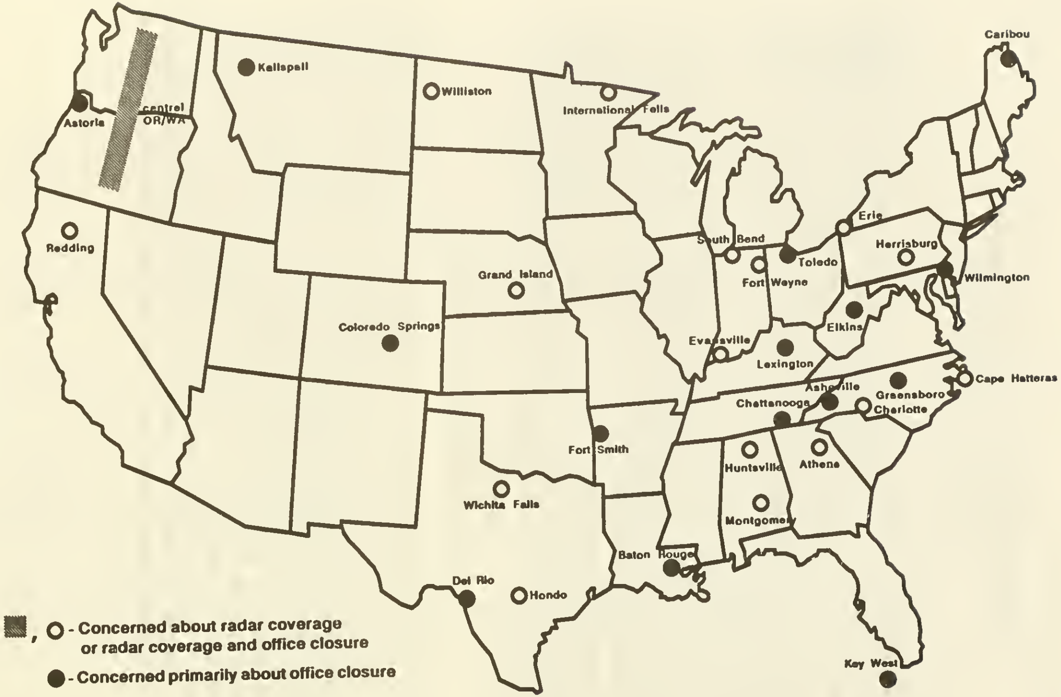

Figure 4-1 Thirty-two geographical areas identified by public comments as being concerned about degradation of service in connection with NEXRAD coverage, decommissioning of existing radars, and/or associated weather office consolidations and closures. Courtesy of NWS.

the hatched area) were concerned about radar coverage or about both radar coverage and office closure. The NWS forwarded the comments to the NRC for use by the NEXRAD panel. Technical information included in the public comments was incorporated into the panel's analyses and was considered during the course of the study.

ASSESSMENT CRITERIA

The panel's charge included the task of "establish[ing] criteria for evaluating the adequacy of coverage of the pre-NEXRAD and the proposed NEXRAD network and areas for decommissioning of existing radars." In response to this task, the panel recommends the following criteria and procedures for use in evaluating the adequacy of NEXRAD coverage for specific areas.

The suggested evaluation criteria are as follows:

1. *Weather phenomena of concern to the area*—Are the weather phenomena of concern detectable by weather radar?
2. *Degradation of radar coverage relative to the weather phenomena of concern*—Do the radar-detection coverage maps for specific weather phenomenon show degraded coverage by NEXRAD?
3. *Performance of the composite system relative to the phenomena of concern*—Does the composite system evaluation indicate that the new system performs as well as the old system?

The suggested evaluation procedures are as follows:

1. Determine the weather phenomena of concern in the area of interest.
2. Examine the relevant weather phenomena radar coverage map(s) to identify regions where radar coverage of each phenomenon is reduced from what had existed with the pre-NEXRAD system.
3. Assess the composite system capability and its impact; especially on reducing the risk to life and property. The composite system elements include, but are not limited to, those listed below.
    - characteristics of local weather phenomena;
    - radar coverage and terrain features;
    - data quality and availability;
    - local spotter network and the user community;
    - adequacy of communications within the composite system and with users;
    - education and training for the forecasters and user community; and
    - other composite system elements, such as ASOS, satellite data, soundings, prior RADAP II and/or ICRAD capability, AWIPS, centralized support products and services, and similar elements.

If an assessment of composite system performance and its consequences concludes that services related to radar coverage would be degraded, then there is inadequate radar coverage for the area. Wherever there is inadequate radar coverage, the NWS should take appropriate actions to reduce the risk of adverse weather consequences to human life and property to acceptable levels. One of the options would be to determine the cost and benefits of providing the needed detection coverage for the area of concern by adding or relocating a NEXRAD or by using some other radar alternative.

The detection coverage charts for specific weather phenomena that were developed by the panel, along with the suggested assessment criteria and procedures, provide a baseline for the NWS (or others) to make decisions on the adequacy of NEXRADs to meet the coverage and service requirements for specific areas. The panel's assessment criteria and procedures should be incorporated into official NWS guidelines and used in conjunction with the requirements in P.L. 102-567.[1]

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[1] The certification criteria for decommissioning an existing radar and consolidating weather offices were published in the *Federal Register*, Vol. 59, No. 41, March 2, 1994, "Rules and Regulations." These criteria included formal actions that certify and commission the supporting NEXRAD, provide adequate notification to users, provide user confirmation of associated services, and determine that the existing radar is no longer needed for service coverage of that area.

5

Conclusions and Recommendations

CONCLUSIONS

Based on an intensive 6-month study, the NEXRAD Panel of the NWSMC arrived at a strong overall conclusion that weather services *on a national basis* will be substantially improved under the currently planned NEXRAD network. The panel's conclusions were as follows:

- The NEXRAD radars generally meet or exceed their technical design specifications in all respects relevant to the detection of weather phenomena and are substantially superior to the radars they are replacing. Therefore, there is no degradation of radar-detection coverage, but always improvement, when a NEXRAD is located at or near the site of one of the old radars. Indeed, the introduction of NEXRAD radars will significantly improve overall storm detection and warning performance and will substantially improve weather services on a national basis.
- Compared to coverage by the old network, the NEXRAD network will provide greater coverage at the 10,000-ft level over the contiguous United States.
- For the detection of specific weather phenomena, that is, supercells, mini-supercells, macrobursts, lake-effect snow, and stratiform snow, the NEXRAD coverage is generally much greater than it was for the old system; for hurricanes, the NEXRAD coverage is complete over the area of risk.
- Digital signal and data processing will permit the production and display of a wide variety of automated weather products which, in turn, will improve the forecasters' ability to rapidly assimilate and use the available data, not only from their NEXRAD but also from neighboring NEXRAD sites.
- The NEXRAD's Doppler feature and other technical characteristics allow for greatly increased capability for short-term forecasting ("nowcasting") of thunderstorm initiation; detection of damaging winds, such as macrobursts and wind shear; and detection of the mesocyclones that are often associated with tornadoes and other severe storm hazards.
- Despite the fact that NEXRAD provides overall network superiority, in areas where the old radar site is relatively distant from the replacement NEXRAD, there may be some degradation in NEXRAD detection coverage. Examples of areas of concern include northern Alabama, northern Indiana, northwestern North Dakota, northwestern Pennsylvania, and southeastern Tennessee.
- The regions of degraded coverage will increase for most weather phenomena if 15 of the DoD NEXRADs that are currently operating in the network are not operated and maintained as part of the national network. Operation of any of these radars with stan-

dards and availability less than those of NWS-operated units will effectively degrade coverage. Principal areas of concern include portions of DoD NEXRAD coverage areas in Alabama, Georgia, Mississippi, and Texas.

- In the national NEXRAD network, there will be four NEXRADs (i.e., Yuma, Arizona; Key West, Florida; Caribou, Maine; and Cedar City, Utah) without a nearby WFO. The reliability of the NEXRAD and the dependability of services derived from it, as well as communications, forecast office staffing, and warning and forecast dissemination, all become even more important when forecasters are remote from the radar site.
- Weather services are influenced by the full complement of observations and products available to the forecaster, as well as by cooperative spotter networks and the skills of experienced forecasters. The performance of this composite system is the critical element in assessing whether areas that have degraded radar-detection coverage will also have a degraded quality of weather services. Such assessments need to include a much more in-depth technical analysis for these areas and locations where there are radar coverage concerns than has been the case to date.

RECOMMENDATIONS

Based on its analyses and on the conclusions derived from them, the panel recommends the following:

1. Where the panel has identified specific geographic areas where degradation of radar-detection coverage may occur, the National Weather Service should examine each potentially vulnerable area to determine whether such degradation would result in degradation of associated weather services.
2. The procedures and criteria for decommissioning old radars are specified in existing National Weather Service documentation; these should be rigorously applied, especially in vulnerable areas. Additional criteria/procedures proposed by the panel (described in Chapter 4, under "Assessment Criteria and Procedures") should be followed in assessing the degradation of service and determining corrective actions. These assessment processes should be incorporated into official National Weather Service guidelines and procedures and used in conjunction with the requirements in P.L. 102-567.
3. The National Oceanic and Atmospheric Administration should take immediate steps to ensure that the 15 NEXRADs under the control of the Department of Defense, which are needed to avoid degraded coverage, function as fully committed elements of the national weather radar network, operating with the same standards, quality, and availability as the National Weather Service-operated NEXRADs.
4. The National Weather Service should ensure that maintenance for, operation of, and communication with NEXRADs that are not located near a Weather Forecast Office are in full accordance with network standards. In addition, responsibilities for weather services to the area covered by these NEXRADs should be unambiguously assigned to a specific Weather Forecast Office to ensure high-quality weather services for that area. Staffing and communications capability should be commensurate with each Weather Forecast Office's service area's responsibilities.
5. The storm-detection and warning performance of the composite national weather system, as a function of range from a NEXRAD, should receive an in-depth independent technical assessment that considers region-specific issues. This assessment should evalu-

ate the warnings and reported events on a per-unit-area basis, as well as the traditional National Weather Service verification statistics. The assessment should include further testing in the Modernization and Associated Restructuring Demonstration in addition to tests at diverse geographic locations.

6. The adequacy of NEXRAD coverage with respect to the "no degradation of service" requirement should be reexamined in an independent study after all National Weather Service NEXRADs are commissioned.

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Acronyms

AGL	Above Ground Level
ASL	Above (Radar) Site Level
ASOS	Automated Surface Observing System
AWIPS	Advanced Weather Interactive Processing System
cm	centimeters
dB	decibels
dBZ	decibels (radar reflectivity ratio)
DoD	Department of Defense
DVIP	Digital Video Integrating Processor
FAR	False Alarm Ratio
GOES	Geostationary Operational Environmental Satellite
ICRAD	Interactive Color Radar Display
kbs	kilobits per second
km	kilometers
MARD	Modernization and Associated Restructuring Demonstration
mbs	megabits per second
NEXRAD	Next Generation Weather Radar
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
NWS	National Weather Service
NWSMC	National Weather Service Modernization Committee
O&M	Operations and maintenance
POD	Probability of Detection
PUP	Principal User Processor
RADAP II	Radar Data Processor II
RDA	Radar Data Acquisition
RFC	River Forecast Center
RPG	Radar Product Generator
SNR	Signal to noise ratio
TVS	Tornadic Vortex Signature
WFO	Weather Forecast Office
WSFO	Weather Service Forecast Office
WSMA	Weather Service Modernization Act
WSO	Weather Service Office
WSR-57	Weather Surveillance Radar -- 1957 (S band)
WSR-74C	Weather Surveillance Radar -- 1974 (C band)
WSR-74S	Weather Surveillance Radar -- 1974 (S band)
WSR-88D	Weather Surveillance Radar -- 1988 Doppler (S band)

Glossary

Boundary Layer: The layer of a fluid adjacent to a physical boundary in which the fluid motion is affected by the boundary and has a mean velocity less than the free-stream value.

Bright Band: The enhanced radar echo of snow as it melts to rain. The bright band is observed primarily in stratiform cloud systems.

Clutter: Echoes that interfere with observation of desired signals on a radar display.

Convective Rain: Rain associated with convective clouds or cumuliform clouds characterized by vertical development in the form of rising mounds, domes, or towers.

Convergence Lines: A horizontal line along which horizontal convergence of the airflow is occurring. Common forms of convergence lines are sea-breeze fronts, cold-air outflows from thunderstorms and synoptic fronts.

Cumuliform: Descriptive of all clouds with vertical development in the form of rising mounds, domes, or towers.

Decibel (dB): A logarithmic expression for the ratio of two quantities. Mathematically: $dB = 10\mathrm{Log}(P_1/P_2)$

Doppler shift: The change in frequency at a receiver due to the relative motion of the receiver and the energy source.

Downburst: A strong downdraft that induces an outburst of damaging winds on or near the ground (macrobursts and microbursts are versions of this).

Eye Wall: The area of tall cumulonimbus storms surrounding the eye of the storm. Heavy rain and very high winds occur in the eye wall. The "eye of the storm" (hurricane, typhoon) is the roughly circular area of comparatively light winds and fair weather found at the center of a severe tropical cyclone.

Freezing Level: The lowest altitude in the atmosphere, over a given location, at which the air temperature is 0 degrees Celsius.

Ground Clutter: The pattern of radar echoes due to fixed ground targets.

Hail: Precipitation in the form of balls or irregular lumps of ice produced by convective clouds, usually cumulonimbus. An individual unit of hail is called a hailstone. By convention, hail has a diameter of 5 mm or more, while smaller particles of similar origin may be classed as ice pellets or snow pellets.

Hook Echo: A pendant, curved-shaped region of reflectivity caused by precipitation being drawn into the cyclonic spiral of a mesocyclone (Davies-Jones, 1985). The hook echo is a fairly shallow feature, typically extending only up to 4 km in height.

Hurricane: Severe tropical cyclone, with winds of 74 mph or greater, occurring in the North Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and in the eastern North Pacific off the west coast of Mexico. A tropical cyclone is a general term for a cyclone that originates over the tropical oceans. At maturity, the tropical cyclone is one of the most intense and feared storms of the world.

Kinematics: Study of the motion of bodies or fluids without reference to the forces producing the motion. In meteorology, the analysis of the motion of isobars and fronts when treated as geometric features.

Lake-effect Snow: Localized snow that occurs over and in the lee of lakes that is caused by relatively cold air flowing over warm water. In the United States this phenomenon is most noted along the south and east shores of the Great Lakes during arctic cold-air outbreaks.

Macroburst: Similar to a microburst (see below) except the damaging winds extend over an area greater than 4 km and may last for tens of minutes. The term "downburst" includes both microbursts and macrobursts without reference to scale (Fujita 1985).

A. Reflectivity signature—Several reflectivity patterns have been associated with macrobursts. One of the most common is the "bow echo," or region in a line of thunderstorms that bulges ahead of the line and is associated with damaging surface winds and occasionally tornadoes.

B. Velocity signature—The velocity signature of a macroburst shows a broad pattern of approaching and receding velocities associated with the strong divergent storm outflow.

Macroscale: Large scale, characteristic of weather systems several hundred to several thousand kilometers in diameter.

Median: A measure of central tendency. The middle value in a set of numbers arranged in order from lowest to highest.

Melting Level: The altitude at which ice crystals and snowflakes melt as they descend through the atmosphere.

Mesocyclone: A horizontal atmospheric rotation on a scale between 4 and 400 km (Fujita, 1981). Its use here refers to a rotation within a thunderstorm typically surrounding a small area of low pressure. Typically within thunderstorms the rotation is 4-12 km across and 4-10 km in height.

Mesoscale: On a scale of 4 km to 400 km.

Microburst: A strong downdraft induces an outburst of damaging winds on or near the ground. Damaging winds, either straight or curved, are highly divergent. The damaging winds extend over an area of less than 4 km and typically last for only a few minutes. This scale of diverging winds has been found to be particularly hazardous to aircraft while landing or taking off (Fujita, 1985).

Mini-supercell: Contains similar severe weather characteristics to a supercell, but the storm is significantly smaller in height and width. The diameter of the radar detected rotation is 1 to 8 km. This is a relatively new storm type whose existence has been confirmed by data from the new Doppler radars in the eastern half of the United States. Differentiating on scale is useful here because of the greater difficulty in detecting these smaller rotations.

Misoscale: On a scale of 40 m to 4 km.

Misocyclone: A horizontal atmospheric rotation on a scale between 40 m and 4 km (Fujita, 1981). Its use here refers to (1) a rotation within a thunderstorm with a horizontal scale < 4 km; and (2) a near-surface rotation along a convergence line with a horizontal dimension < 4 km.

Nautical mile: An international unit equal to 6,076.115 feet (1,852 meters) used officially in the United States since July 1, 1959. 1 nautical mile = 1.15 statute miles = 1.85 kilometers.

Nowcast: Statement of currently occurring weather conditions; also used to mean short-term forecast, that is, minutes to a few hours.

Pre-NEXRAD Network: Network of radars established before the introduction of the WSR-88D.

Reflectivity: A measure of the efficiency of a radar target in intercepting and returning radio energy, including effects of reflection, scattering, and diffraction.

Resolution: The smallest increment of a measurement of a parameter.

Storm: A disturbed state of the atmosphere strongly implying destructive or unpleasant weather.

Stratiform: Descriptive of clouds of extensive horizontal development, as contrasted to the more narrow and vertically developed cumuliform types.

Stratiform Rain: Horizontally widespread rain, uniform in character, typically associated with macroscale fronts and pressure systems.

Stratiform Snow: Same as for stratiform rain except precipitation is in the form of snow.

Supercell: Potentially the most dangerous convective storm type. It may produce high winds, large hail and long-lived tornadoes over a wide path. In its purest form it consists of a single, quasi-steady, rotating updraft that may have a lifetime of several hours (Weisman and Klemp, 1986). The radar-identified rotation typically has a diameter of 4 km to 12 km.

Thin-line Echo: A narrow, elongated nonprecipitating echo, usually associated with thunderstorm outflow, fronts, or other density discontinuities. Also called a "fine line."

Tornadic Vortex Signature (TVS): A Doppler velocity signature sometimes produced by a large, intense tornado at close range. The signature is a very strong azimuthal shear in a distance < 2 km.

Tornado: A violently rotating column of air, pendant from a cumulonimbus cloud, and nearly always observable as a "funnel cloud." On a local scale, it is the most destructive of all atmospheric phenomena. Its vortex, commonly several hundreds of meters in diameter, whirls cyclonically with wind speeds estimated at 50 m/s to 150 m/s.

Wind Shear: The rate of change of the vector wind in a specified direction normal to the wind direction. Vertical shear is the variation of the horizontal wind in the vertical direction.

WSR-88D System: Combination of the hardware, software, facilities, communications, logistics, staff, operations, and procedures for the collection, processing, analysis, dissemination, and application of data from the WSR-88D unit.

WSR-88D Unit: Combination of one radar data acquisition, one radar product generator, all associated radar product generator operational positions and principal user processor, and interconnecting communications of the WSR-88D.

Appendix A

Criteria for Evaluation of a Weather Radar System

The criteria for comparison of the Next Generation Weather Radar (NEXRAD) and pre-NEXRAD systems fall into three broad areas:

1. technical aspects including detection capabilities;
2. warning performance; and
3. products and services offered.

RADAR TECHNICAL ASPECTS

This section provides a system description and radar performance specifications and discusses the key radar technical aspects that were considered in developing criteria for addressing the quality of radar coverage. Key radar technical aspects include coverage at specific altitudes, spatial and temporal resolution, sensitivity, Doppler coverage, and radar availability.

Other technical aspects of radar operation (e.g., clutter suppression, antenna beam patterns, algorithms, and data archiving) are also discussed in this section. However, these did not enter directly into the evaluation of the detectability of weather phenomena for the "quality of service" assessment. The discussion of radar technical aspects concludes with a description of NEXRAD technical improvements.

System Description

The pre-NEXRAD NWS radar network consisted of 128 WSR-57, WSR-74S, and WSR-74C radars. The WSR-57 and WSR-74S radars, both 10-cm-wavelength systems, were configured as manually operated surveillance radars; the 68 WSR-74C, 5-cm radars functioned as "local warning" radars. The NEXRAD network, when complete, will consist of 138 10-cm WSR-88Ds in the contiguous United States, including 22 Department of Defense (DoD) radars. Beyond the contiguous United States, seven NEXRADs are planned in Alaska, four in Hawaii, three in the Caribbean, and several other systems in locations around the world.

Radar Performance Specifications

Table A-1 gives the technical characteristics of the NEXRAD and comparable values for the pre-NEXRAD radars. NEXRAD is a Doppler radar system that routinely generates products involving both reflectivity and velocity information. The reflectivity estimates of the NEXRAD have significantly higher data quality than the pre-NEXRAD systems due to higher spatial resolution of the narrow antenna beam, increased sensitivity to weak echoes, new Doppler clutter-suppression processing, and new calibration procedures. Radar coverage with limited Doppler capability was available in the pre-NEXRAD NWS network only at Montgomery, Alabama; Marseilles, Illinois; and Huntsville, Alabama. Therefore, for weather phenomena that can only be detected using Doppler features (e.g., mesocyclones or microbursts), limitations in the NEXRAD network Doppler coverage are not a factor for most of the country under the "no degradation of service" criterion. Where a combination of Doppler and reflectivity features is used for phenomena detection (e.g., supercells), limitations in the NEXRAD Doppler coverage could be a factor in those geographic areas where NEXRAD coverage at long range must be compared to pre-NEXRAD coverage at short range.

TABLE A-1 Radar Characteristics—Pre-NEXRAD and NEXRAD

	NEXRAD	WSR-57	WSR-74S	WSR-74C[a]
P_t = Transmitter peak output power (MW)	0.750	0.500	0.500	0.250
G = Antenna gain (dB)	45.5	38.5	38.5	40
λ = Wave length (cm)	10.53	10.71	10.71	5.33
ℓ^2 = Propagation loss (dB) @ 0.5° @ 50km	0.7	0.7	0.7	0.8
@ 230 km	2.5	2.5	2.5	2.8
θ_1 = Beam width (deg)	0.95	2.0	2.0	1.5
τ = Pulse width (μsec)	1.57	4.00	4.00	3.00
B_n = Noise band width (MHz)	0.79	0.75	1.50	0.80
T_{sys} = System noise temp (K)	600	1700	1000	2150
Z_{min} = Min detectable dBZ @ 50 km (single pulse)	-7.6	-0.2	0.3	-1.7
Doppler Feature	yes	no	no	no
Clutter Suppression	yes	no	no	no

[a] The Huntsville, Alabama, WSR-74C has enhanced capabilities—$G = 43$ dB, $\theta_1 = 1.0$ degree, $\tau = 2.0$ μsec, $Z_{min} < -5$ dBZ, Doppler and clutter suppression.

The NEXRAD has three major components, as shown in Figure A-1. These components are the radar data acquisition (RDA) unit, the radar product generator (RPG), and the principal user processor (PUP) (Crum and Alberty, 1993). The RDA includes the transmitter, antenna, receiver, signal processor, and Level 2 base data (wide band) communications interface. The RPG includes the computing power that generates the image products and the narrow band communications interfaces. The PUP is the processor workstation with which the forecaster requests and receives NEXRAD products. "Associated" PUPs are permanently connected with the RPG and routinely receive specified sets of products. "Non-associated" PUPS are intermittently connected to any NEXRAD via a dial-up, low-speed communication line and receive only requested products.

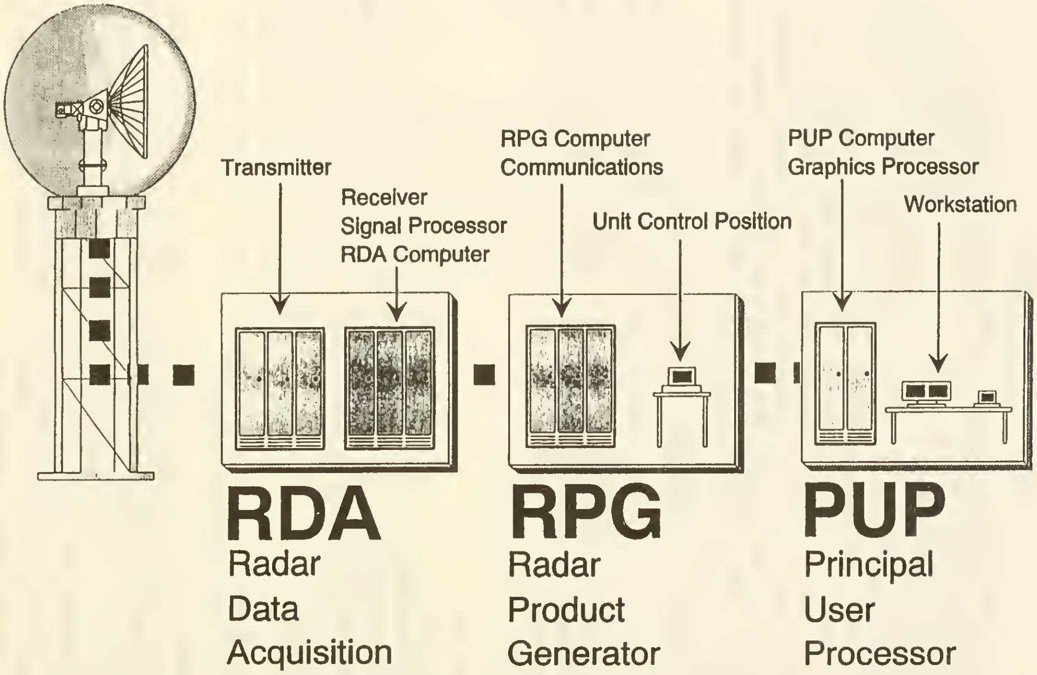

Figure A-1 The three major components of the NEXRAD system. Major subcomponents of each component are also depicted. A wideband (1.544 mbs) communication link transmits Radar Data Acquisition data to the RPG. The RPG units are connected to PUPS by narrowband links (56 kbs for NWS collocated PUPs, and 9.6 kbs for others). Courtesy of NOAA/NWS.

The Doppler capability of the WSR-88D allows measuring storm kinematics (i.e., velocity information) to generate more-accurate and timely weather advisories and warnings while suppressing interfering ground echoes; thereby improving short-range and low-altitude coverage. Another important design improvement is the availability of digital information in a variety of displays from the NEXRAD.

Spatial Coverage

In planning the layout of the NEXRAD network, consideration was given to the distribution of population within the contiguous United States. In meeting the needs of the sponsoring agencies, further siting criteria included proximity to existing or planned Weather Forecast Offices and to high-use commercial airports and designated high-value military facilities.

On a smooth spherical Earth, the coverage provided by a particular radar *would be* limited by the curvature of the Earth and the refraction of the microwaves in the atmosphere. Because of those factors, the maximum range of potential coverage for a given altitude is represented by a circle with the radar located at the center. Due to blockage of the radar beam by intervening terrain features, however, the area actually covered at a given altitude is not circular in some cases (particularly in the West). When the coverage zones of all operational radars are plotted and superimposed, the resulting "coverage map" provides one of the aids for evaluating the adequacy of radar coverage. Maps shown later in this appendix illustrate this coverage, or radar field of view. Radar resolution, sensitivity, and the forecaster's expertise must be added to the field-of-view in determining overall quality of service.

Generally the ability to detect weather phenomena decreases with increasing radar range because the low-altitude coverage, the radar resolution, and radar sensitivity all deteriorate with increasing range. In addition, there is a "cone of silence" above the radar, as illustrated in Figure A-2. This deficiency may be alleviated by observations from neighboring NEXRADs over most of the United States east of the Rocky Mountains.

At close ranges (up to, perhaps, 40 km) the interfering effects of ground clutter are at a maximum.[1] The NEXRAD clutter suppression feature mitigates this limitation to a considerable extent. At long ranges both the Earth's curvature and the increasing resolution cell size reduce the radar's ability to detect weather phenomena. These two features are illustrated in Figure A-3. For each weather phenomenon shown, no combination of resolution and sensitivity can compensate for the fact that the radar beam is simply too high above the ground for effective detection. Weather targets that protrude into the lower edge of the beam may be detected because of the NEXRAD's sensitivity. The restrictive effect of the Earth's curvature is a function of the height of the weather phenomenon and the degree to which signals received from high levels can be interpreted effectively in terms of weather at lower heights. At long ranges, the width of the beam may prohibit resolution of fine details of the echo structure needed to identify particular weather phenomena. Representative ranges for detecting various weather phenomena are discussed in Chapter 2.

The coverage at various altitudes for both the pre-NEXRAD and NEXRAD networks has been mapped. Figure A-4a shows the NEXRAD altitude coverage, that is, where the NEXRAD coverage

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[1] All radars receive signals scattered from the ground. These signals are called "ground clutter" because the returns interfere with the signals from weather targets and often obscure the weather signal entirely. This problem is particularly severe at close range (approximately out to 40 km) but is also strongly influenced by terrain, especially in hilly or mountainous regions. Cities with tall buildings also produce strong clutter signals that can obscure weather above them.

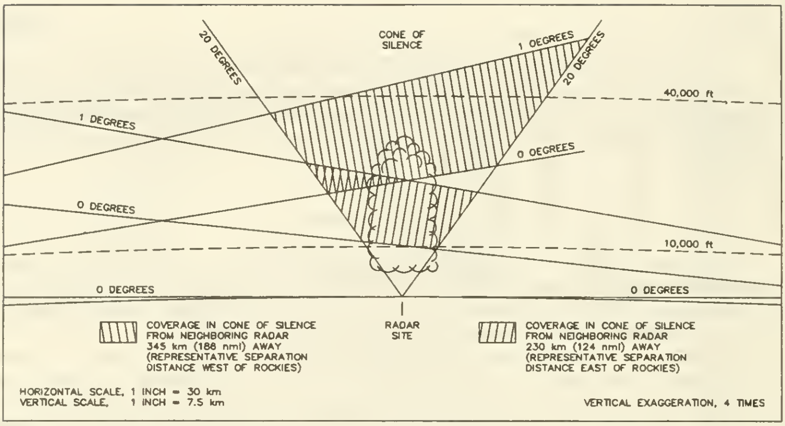
CONE OF SILENCE
20 DEGREES
20 DEGREES
1 DEGREES
40,000 ft
1 DEGREES
0 DEGREES
0 DEGREES
10,000 ft
0 DEGREES
0 DEGREES
COVERAGE IN CONE OF SILENCE FROM NEIGHBORING RADAR 345 km (186 nml) AWAY (REPRESENTATIVE SEPARATION DISTANCE WEST OF ROCKIES)
RADAR SITE
COVERAGE IN CONE OF SILENCE FROM NEIGHBORING RADAR 230 km (124 nml) AWAY (REPRESENTATIVE SEPARATION DISTANCE EAST OF ROCKIES)
HORIZONTAL SCALE, 1 INCH = 30 km
VERTICAL SCALE, 1 INCH = 7.5 km
VERTICAL EXAGGERATION, 4 TIMES

Figure A-2 Cone of silence for the NEXRAD. The cone of silence has a radius of 34 km at 40,000 ft and a radius of 8.5 km at 10,000 f Elevations higher than 19.5 degrees are not scanned using the existing volume coverage patterns; therefore, radar echoes are not receive from within this cone directly above each radar. Overlapping coverage from adjacent radars is needed to cover this region and is shown f two radars operating with a 1-degree beam width centered at 0.5 degrees elevation. Courtesy of SRI International.

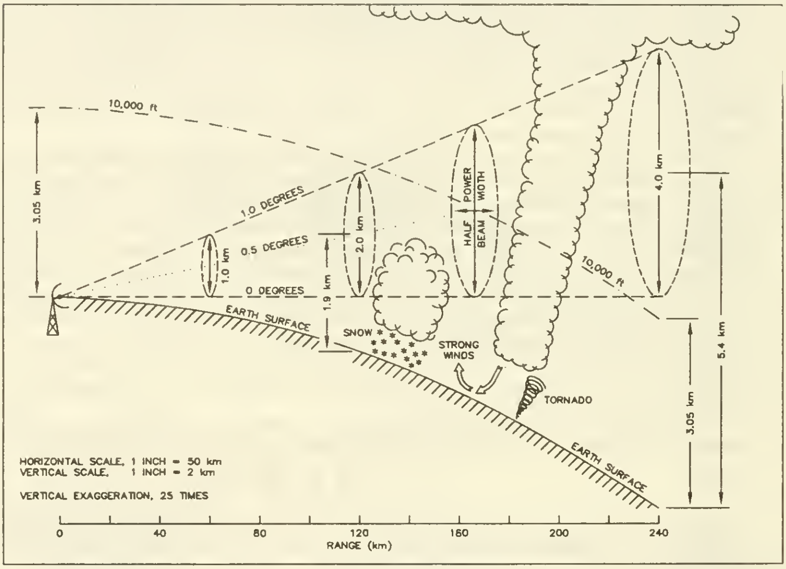

Figure A-3 Diagram illustrating the effect of range and earth curvature (with standard atmospheric refraction) on NEXRAD cross-beam resolution and coverage of low-level weather phenomena. Courtesy of SRI International.

at 0.0 degrees (lower half-power edge of a 1-degree beam that is centered at 0.5 degrees) extends down to or below 4,000 ft (red), between 4,000 ft and 6,000 ft (yellow), between 6,000 ft and 10,000 ft (green), and between 10,000 ft and 40,000 ft (blue) above site level (ASL). All altitudes in the figure are given ASL. Figure A-4b shows a map indicating differences between the two networks in minimum-altitude coverage over the contiguous United States and bordering areas—red indicating that the NEXRAD coverage reaches to lower altitudes than the pre-NEXRAD coverage, blue the converse, and green indicating regions of similar coverage. The blue areas indicate regions of potential degradation of service with the NEXRAD network. The pie chart in Figure A-4b shows that the NEXRAD coverage is similar to, or better than, the earlier network over most of the contiguous United States. However, over about 7 percent of the area, the earlier network coverage extends to lower altitudes. Altitude coverage, alone, is not equivalent to service, however, as discussed elsewhere in the report and in this appendix.

Resolution

Spatial resolution is important from a meteorological perspective since better radar resolution (i.e., a smaller radar-resolution cell) allows detection of smaller-scale features, such as tornado circulations, mesocyclone circulations, and hail or rain shafts, at greater ranges. Spatial resolution is defined as the maximum dimension of the volume "illuminated" by a pulse. At close ranges the resolution is governed by the pulse length, and at long ranges it is governed by the antenna beam width. The narrower beam of the NEXRAD antenna gives it an advantage over earlier National Weather Service (NWS) radars in resolution capability at long range. Figure A-3 depicts the NEXRAD beam-width dimension as a function of range.

Radar systems often average information over several adjacent resolution cells along the range direction to improve detectability and to measure the returned signal strength more precisely, but this is done at the expense of range resolution. In the NEXRAD reflectivity mode, four such cells of 250-m length are averaged together to yield an effective range resolution of 1 km. Comparable range resolution was obtained from the pre-NEXRAD radars using longer transmitted pulses. Table A-2 gives

TABLE A-2 Approximate Spatial Resolution Dimensions

Radar	Range Resolution	Cross-Beam Resolution At:		
		6 km	60 km	180 km
NEXRAD	1.0 km (reflectivity) 0.3 km (velocity)	100 m	1.0 km	3.0 km
WSR-74C	0.5 km	150 m	1.5 km	4.5 km
WSR-74S	0.6 km	200 m	2.0 km	6.0 km
WSR-57	0.6 km	200 m	2.0 km	6.0 km

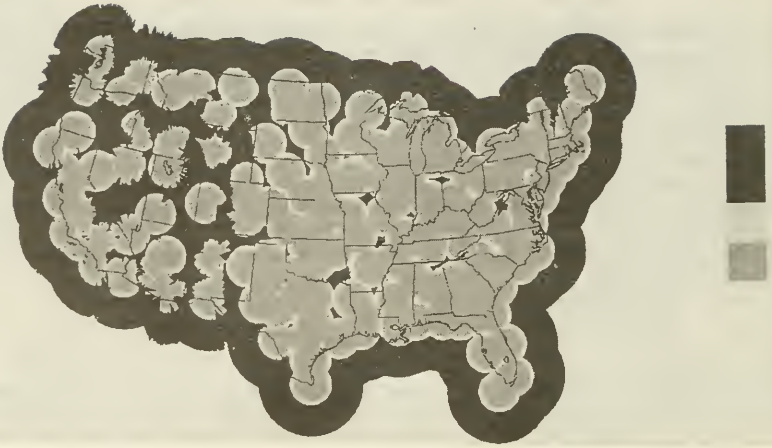

Figure A-4a NEXRAD altitude coverage. The figure indicates where the NEXRAD coverage at 0.0 degrees (lowe half-power edge of a 1-degree beam that is centered at 0.5 degrees) extends down to or below 4,000 ft (red), betwee 4,000 ft and 6,000 ft (yellow), between 6,000 ft and 10,000 ft (green), and between 10,000 ft and 40,000 ft (blue above site level. Courtesy of SRI International.

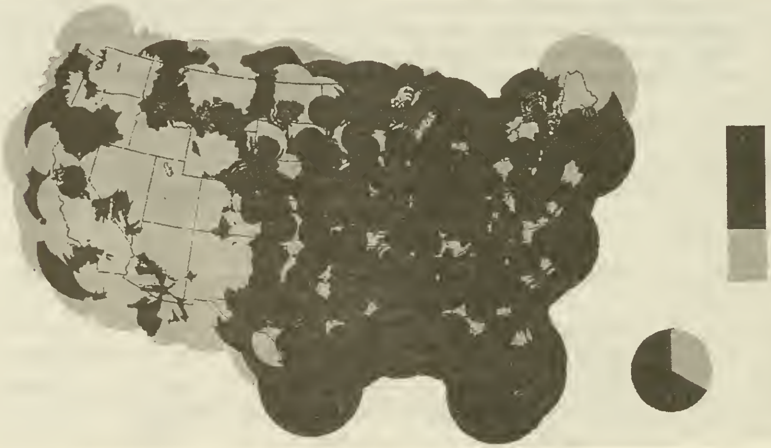

Figure A-4b Areas of contiguous United States and border regions having better radar coverage (i.e., coverage t lower altitudes above site level) with the NEXRAD network (red), with the pre-NEXRAD network (blue), and wit the same coverage by both (green). The pie chart shows the fraction of the total area having lower-altitude coverag as indicated. Courtesy of SRI International.

the approximate spatial resolution of the base data for each of the radars at ranges of 6 km, 60 km, and, 180 km. Note that cross-beam resolution at 60 km is 1 km for the NEXRAD and about 2 km for the pre-NEXRAD radars.

Figure A-5a shows the resolution of the NEXRAD network for the 10,000-ft ASL coverage. The colors on the figure indicate resolution dimensions of less than 1 km, between 1 and 2 km, and between 2 and 4 km. Figure A-5b compares the resolution capabilities of the two networks for 10,000-ft coverage over the contiguous United States and bordering areas. The red areas indicate where the NEXRAD network provides better resolution; the blue areas indicate where the old network had better resolution capabilities; and green areas indicate where the resolutions were essentially the same. The blue areas do not imply a degradation of service but indicate regions that are candidates to examine for potential degradation of service. As indicated by the cumulative distributions in Figure A-6, the NEXRAD network will cover about 86 percent of the contiguous United States and bordering areas with resolution better than 4 km. (The percentage would be reduced slightly without the DoD radars.) The pre-NEXRAD network provided 4-km resolution over only 46 percent of the area.

Temporal resolution is also important in observing rapidly evolving weather features. The NEXRADs operate on predetermined scan patterns, and the temporal resolution of the volume data is 5 to 6 min (i.e., the scans are repeated every 5 to 6 min). Access to this continuously evolving volumetric data allows the forecaster to analyze time sequences that yield a better understanding of evolving weather. Furthermore, the PUP processing of volume-scan data allows analysis of vertical cross-sections of the radar echo to determine the vertical structure of the storms. The temporal resolution of the pre-NEXRAD network was considerably more variable and more difficult to assess because the radars were manually operated for any volume-scan functions. When used interactively, pre-NEXRAD radars could detect changes in severe storm phenomena in less than 1 min. However, on the basis of the evidence available to the panel from NEXRAD operators experienced with the old radars, the panel concludes that the type and amount of information from NEXRAD's set scan strategy, especially use of the four-panel storm and velocity structure display, is as effective as a vertical scan and has contributed to the improved probability of detection for severe storms.

Sensitivity

The NEXRAD is about 10 times more sensitive than any of the previous radars. The sensitivity of a radar as a function of range can be determined using conventional weather radar equations (Battan, 1973; Doviak and Zrnic, 1993). Figure A-7 shows the sensitivity versus range for all four radar types of concern.

The sensitivity curves of Figure A-7 show the single-pulse radar sensitivity, defined as the reflectivity factor that would yield unity signal-to-noise ratio (SNR=1) of the received echo. The processing gain of the digital video integrating processor (DVIP) in the pre-NEXRAD systems and the signal processor of the NEXRAD reduce the variance of the reflectivity by averaging adjacent range gates. However, when data thresholds are used, this process frequently precludes realizing any gain in detectability. Since the pre-NEXRAD systems were not operated to observe low-reflectivity echoes, the DVIP typically suppressed any echoes below 18 dBZ, yielding acceptable operational performance. The NEXRAD more effectively processes the received signals and observes the low-reflectivity echoes in generating some products.

The network sensitivity at a given altitude for any contiguous United States location is the best sensitivity value of all network radars that provide coverage to that altitude at that location. Figure A-8a shows the sensitivity of the NEXRAD network on the 10,000-ft coverage map. Figure A-8b compares the sensitivities of the NEXRAD and pre-NEXRAD networks at the 10,000-ft level. In the figure, red denotes locations where the NEXRAD network has better sensitivity; blue denotes locations where the pre-NEXRAD network has better sensitivity; and green indicates equivalent sensitivity. White indicates no coverage at that altitude by either system. As before, the blue regions indicate a potential degradation in quality of service. However, one must also consider the sensitivity question in the context of the ability to observe specific weather phenomena as discussed in Chapter 2.

The cumulative radar sensitivity distributions in Figure A-9 indicate that the NEXRAD network will cover more than 80 percent of the contiguous United States and bordering areas at the 10,000-ft level with sensitivity sufficient to detect all precipitation echoes of consequence (5 dBZ or greater) as well as many echoes of nonprecipitation origin. The pre-NEXRAD network has this capability over only 30 percent of the area. For most purposes radar sensitivity does not limit the operational performance of the NEXRAD, but its greater sensitivity allows detection of a greater percentage of weak weather phenomena than the pre-NEXRAD radars could observe.

Doppler Coverage

The Doppler coverage (i.e., the region over which Doppler radial velocities are provided) is important in determining network capability to detect a number of weather phenomena, as discussed in Chapter 2. The Doppler coverage may differ from the coverage shown earlier due to two factors. These factors are as follows:

1. If minimum signal-to-noise ratio thresholds are imposed, a stronger echo may be required for Doppler velocity than for reflectivity measurement. This can reduce the effective range of Doppler coverage.
2. The Doppler velocities are measured with transmitted waveforms having ambiguities at multiples of approximately 115 km for the NEXRAD.[1] Thus, although the maximum stated Doppler range is approximately 230 km, the transmitted signals are such that Doppler data can sometimes be provided for only half of that range. Even then, if there are comparable weather echoes in the first two ambiguity intervals, for example, at x and (x + 115) km, no Doppler information may be available in either interval. Regions where Doppler velocity information is not available due to SNR or range-ambiguity considerations are portrayed on the PUP in a purple color, thus giving rise to the NEXRAD "purple-haze" display.

The impact of the above considerations is that NEXRAD Doppler coverage is not always available beyond the 115 km range and that it is sometimes impaired even at lesser ranges.

Availability Of Radars

For successful support of NWS operations, it is essential that the radars be available for use on a nearly full-time basis. System availability and reliability affect the accuracy and timeliness of forecasts and warnings of many weather phenomena. The NEXRAD radars have been designed for continuous, unattended operation with the expectation of an increased availability of the radars. Not

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[1] The NEXRAD program office is modifying the radar wave forms and software to extend the unambiguous range to approximately 165 km.

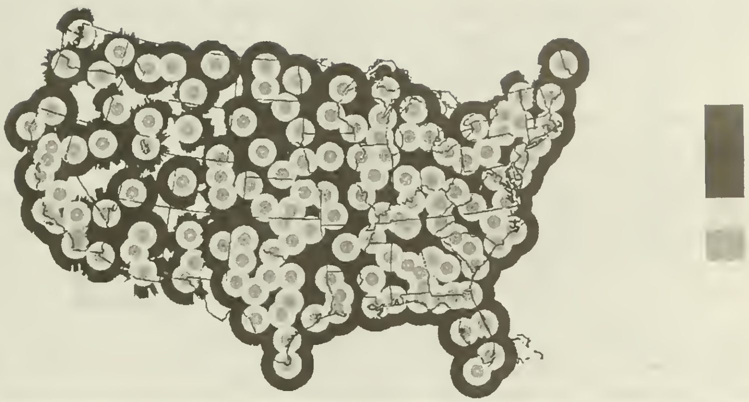

Figure A-5a NEXRAD resolution coverage at 10,000 ft above site level. Red depicts the area over which the beam-resolution cell is less than 1 km; yellow, between 1 km and 2 km; and green, between 2 km and 4 km. Courtesy of SRI International.

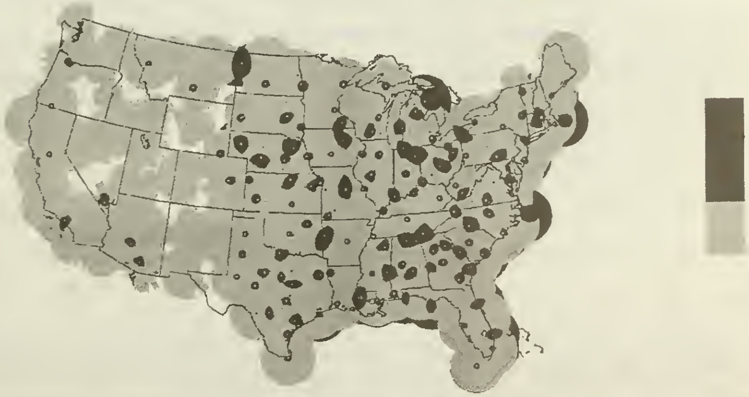

Figure A-5b Areas of the contiguous United States and border regions having better resolution coverage at 10,000 ft above site level with NEXRAD (red), with equal resolution by pre-NEXRAD and NEXRAD networks (green), and with better resolution by the pre-NEXRAD network (blue). Courtesy of SRI International.

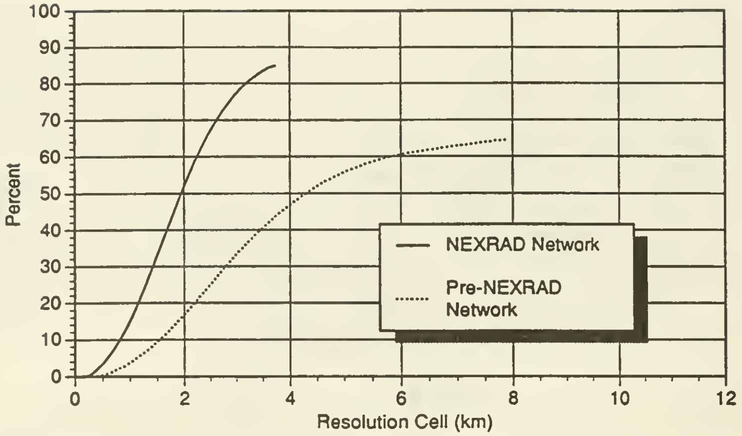

Figure A-6 Cumulative resolution distribution functions. The figure indicates the percentage of desired coverage area (contiguous United States plus bordering areas) at 10,000 ft above site level having resolution cell size smaller than that shown on the abscissa for pre-NEXRAD and NEXRAD networks. Courtesy of SRI International.

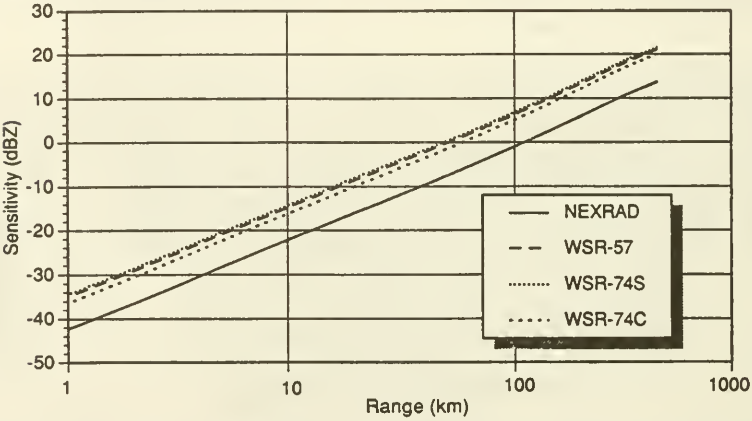

Figure A-7 Radar sensitivity curves showing reflectivity factor (dBZ) versus range for the single-pulse radar return power that yields equal signal and noise power, SNR = 1. (The sensitivity curves for the WSR-57 and the WSR-74S are nearly superimposed.) The processing gain to reduce the variance of base data reflectivity estimates is not shown in these curves. The NEXRAD value is based on the short-pulse mode; however, the NEXRAD long pulse increases sensitivity by 5 dB. Courtesy of SRI International.

only must the RDA, RPG, and PUP subsystems be available, but also the communication links among the three must be equally available for controlling the radar, requesting products, and receiving the base data and products. Important factors that impact system availability and reliability are

- availability of spare parts;
- responsiveness of parts distribution system;
- availability of qualified maintenance staff;
- maintenance education and training programs;
- availability of qualified radar meteorologists;
- radar operations education and training programs;
- reliable and effective communications to serve operations and maintenance activities; and
- adequate funding to support operations and maintenance activities.

Table A-3 gives availability statistics for the first 56 installed NEXRADs over a recent 27-month period, along with roughly comparable (and the best obtainable) statistics for the 3 pre-NEXRAD systems over the preceding 50 months. These initial availability data show that the NEXRAD systems are performing at the expected 96 percent availability level required for commissioning. The pre-NEXRAD systems indicate higher availability, but downtime for preventive maintenance, logistics delays, and system modifications was not included in the computation (such downtime data were never logged). This factor makes it difficult to provide a comparative assessment of network availability.

TABLE A-3 Weather Radar Availability Statistics

Radar	Availability (%)
NEXRAD	96.3 (does not include DoD radars)
WSR-57	98.5[a]
WSR-74S	98.2[a]
WSR-74C	99.1[a]

[a] Not considered reliable data or representative because outage times were not as rigorously defined nor adhered to in the pre-NEXRAD systems.

The availability of the DoD radars in the contiguous United States is important in considering NEXRAD network coverage and quality of services. Statistics on DoD radar availability were not available, but the panel received some reports of slow response in DoD maintenance of a DoD NEXRAD. The budgetary pressures on DoD, including possible base closings, raise additional concerns about availability of those NEXRADs. The possible impact of limited DoD NEXRAD availability has been addressed in this study by considering both the full NEXRAD network and a degraded network that includes only NWS NEXRADs when assessing the ability to detect certain weather phenomena.

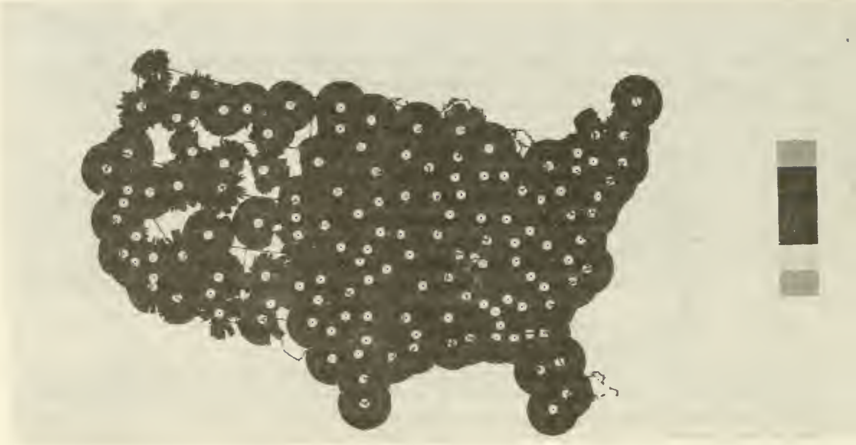

Figure A-8a NEXRAD sensitivity coverage at 10,000 ft above site level. The colors change in 10-dB increments, starting with the -30 dBZ to -20-dBZ increments as the initial sensitivity, which is shown as red (innermost concentric circle). Courtesy of SRI International.

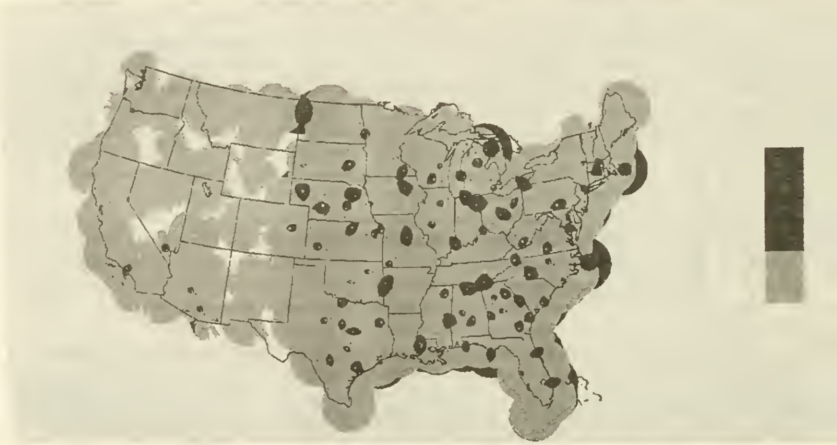

Figure A-8b Comparative sensitivity of pre-NEXRAD versus NEXRAD network at 10,000 ft above site level. indicates that the NEXRAD network sensitivity is better; green indicates equal sensitivity; and blue indicates that pre-NEXRAD network was more sensitive. Courtesy of SRI International.

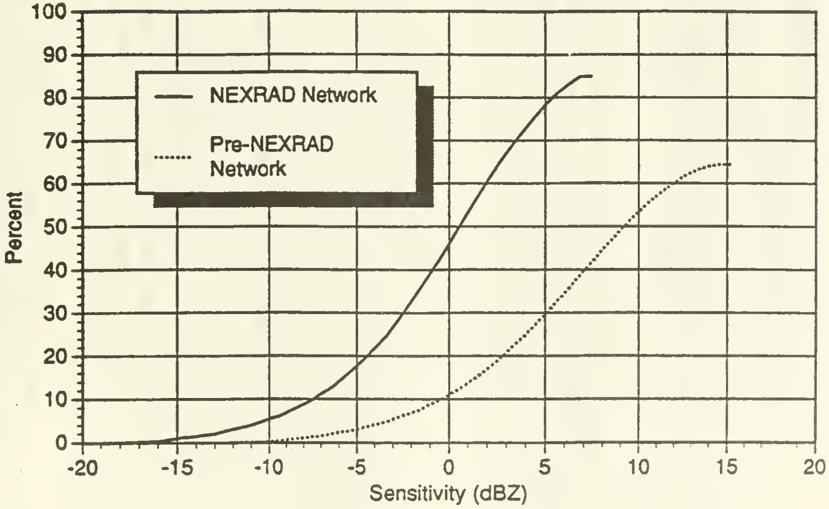

Figure A-9 Cumulative radar sensitivity distribution function. The figure shows the percentage of desired coverage area at 10,000 ft above site level having a minimum detectable reflectivity factor less than the sensitivity shown for both the pre-NEXRAD and NEXRAD networks. The median sensitivity is increased by about 10 dB with the NEXRAD network. Courtesy of SRI International.

NEXRAD Technical Improvements

There are a number of technical improvements in the NEXRAD system. Improvements have been made in terms of the transmitter and receiver, antenna, Doppler signal processing, and the digital information system. These technical improvements are discussed in the following sections.

Transmitter and Receiver

The NEXRAD transmitter is a phase-stable, high-power, klystron-based transmitter, in contrast to the lower-power magnetron systems of the pre-NEXRAD radars. The phase stability allows digital processing to improve the processing and display quality and to reject strong interfering clutter signals. The NEXRAD receiver uses modern low-noise amplification and wide-dynamic-range amplifiers to yield higher SNR signals from low-reflectivity weather targets even at distant ranges (Heiss et al., 1990).

Antenna

An important aspect of radar coverage is defined by the radar antenna beam pattern. The majority of the transmitted energy is radiated into a conical main beam about 1 degree wide. This beam width governs the resolution capability of the radar, except at very short ranges. However, a significant fraction of the energy is spread into the antenna "sidelobes" at angles outside the main beam. Typical azimuthal cuts of the antenna patterns for the NEXRAD and WSR-57 radars are shown in Figure A-10.

The early radars, particularly the WSR-57s, had antenna sidelobe levels so high that ground clutter often made short-range and low-altitude coverage virtually impossible unless the radar operator manually raised the antenna elevation enough to reduce the clutter. The WSR-57 antenna has sidelobes only about 18 dB down from the main lobe response (Wilk et al., 1965). Short-range and low-altitude coverage of the NEXRAD is improved by virtue of significantly better antenna sidelobe response and active clutter filtering in the radar processor. The NEXRAD has measured sidelobes down 29 dB from the main lobe response, using linear polarization with the radome in place (Sirmans, 1993). The much-improved sidelobe suppression provides an additional 20 dB (two way) of clutter suppression.

Doppler Signal Processing

Some weather radars, namely, the NEXRAD and three pre-NEXRAD systems with limited Doppler capability, measure the velocity of the weather target toward or away from the radar (i.e., the "radial velocity") in addition to measuring the reflectivity of the target. Knowledge of the radial-velocity characteristics of a weather target provides important assistance in recognizing and quantifying certain significant weather phenomena, such as tornadic storms, wind shear, or high surface winds with precipitation. This knowledge is also useful in general weather forecasting. Additionally, the Doppler feature provides vertical wind profiles and enables the radar to reject returns from stationary objects (i.e., "ground clutter") based on the radial-velocity information of the radar echo (*Federal Meteorological Handbook*, 1990).

The NEXRAD Doppler signal processor uses modern digital signal processing to compute accurate estimates of radar reflectivity and velocity while simultaneously suppressing interference and artifacts in the data, such as ground clutter. The WSR-57s and WSR-74s had no clutter-cancellation capability. The NEXRAD electronic clutter-cancellation feature reduces clutter by 30 dB in reflectivity mode. In Doppler mode, filters reduce clutter by 50 dB. Thus, including the 20 dB of additional clutter suppression through the reduction of antenna sidelobes, the NEXRAD gives about 50 to 70 dB of

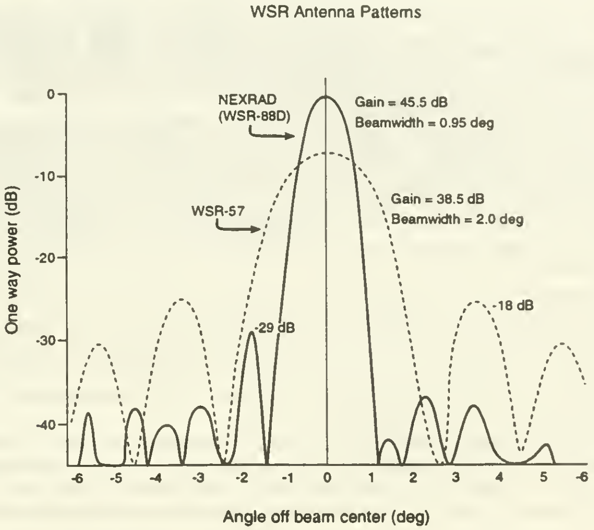

Figure A-10 Antenna radiation patterns (relative scale) showing main beam and first few sidelobes. The NEXRAD has a half-power beam width of 0.95 degrees while that of the WSR-57 is 2.0 degrees; the sidelobes of the NEXRAD are typically 10 dB lower than those of the WSR-57. The on-axis gain of the NEXRAD antenna is about 7 dB higher than that of the WSR-57. Based on data from Wilk et al., 1965 and Sirmans, 1993.

clutter suppression as compared with the WSR-57. This allows better coverage of the closest ranges, while suppressing isolated clutter, including much anomalously propagated ground clutter.

Digital Information System

The digital information system encompasses features that provide tools or capabilities for forecasters (Crum et al., 1993). They include the following:

- signal processing that provides digital or analog radar data from which weather products can be displayed or derived;
- algorithms that translate radar data into weather information—for example, radar reflectivity translated into rainfall rate and cumulative rainfall over some period of time, or reflectivity and velocity data combined in a hail detection and hail severity product;
- products that present this information in graphical image or alphanumeric format (Klazura and Imy, 1993);
- displays, which provide presentations of radar data and derived products; and
- data archiving (recording), which allows post-facto analysis to improve algorithms and products.

One technological advance incorporated into the NEXRAD systems is the provision of color displays. These displays enable the meteorologist to see informative images quantifying the weather conditions with the spatial and temporal resolution necessary to comprehend the mesoscale situation and the effects on local conditions. Moreover, the ability to make and view time-lapse imagery allows more accurate, targeted, and timely forecasts to be issued.

The NEXRAD automatically generates a specific list of products and distributes them to the associated PUPs without operator intervention. With these communications capabilities, the RPG can serve multiple users (multiple PUPs), meeting the specific needs of each. In addition, meteorologists can request additional products, which are produced by the RPG as processing time permits.

The Level 2 base data are the three quantities computed for each range bin of each radial of information: (1) the radar reflectivity factor (1-km resolution); (2) the velocity (at 250-m resolution); and (3) the spectrum width (at 250-m resolution). These base data are archived on 8 mm digital data tapes for later perusal and analysis by station meteorologists or the broader meteorological community in investigation of particularly interesting events. This can aid in developing new products, permit analysis of system performance, and serve as a climatological data base. New product development may require both full-range resolution reflectivity data (i.e., 250-meter spacing) and enhanced processing to improve the base data quality. The Level 3 product data are a subset of the various products. The data are routinely stored on disk for a relatively short period of time for later retrieval and analysis and are also archived for permanent record.

The NEXRAD network allows any given user to access data from radars in adjacent service areas. Furthermore, the four private NEXRAD information dissemination service data providers create national mosaics of NEXRAD products (Baer, 1991). These mosaics, because of their increased quantitative products, are superior to those provided through the pre-NEXRAD network.

WARNING PERFORMANCE

The issuance of weather advisories and warnings is supported by automated functions in the radar, however, it depends primarily on the expertise of well-trained forecasters. Evaluation of a system's warning performance is likewise partly objective and quantifiable and partly subjective and empirical. The panel has accounted for both the detection performance described above and the forecaster warning experience; taken together, they define the overall system performance. It is clear that the detection capability of the NEXRAD directly affects the warning performance. As such, both detection capabilities and warning performance represent the core of the most significant conclusions in this report and were used to develop assessment criteria for evaluating the potential degradation of service. The detection capability is discussed in detail in Chapter 2, "Radar Network Configuration and Detection Capabilities," and in Chapter 3, "Comparison of Weather Services: Pre-NEXRAD and NEXRAD."

PRODUCTS AND SERVICES OFFERED

Advisories and warnings of significant weather phenomena are relayed to the public and other users through a wide variety of specific products and services. These products and services are tailored to particular user communities (i.e., aviation, marine, agricultural, general public, etc.) and are disseminated through specific communications media (i.e., NOAA Weather Wire Service and Weather Radio, Federal Aviation Administration radio broadcasts, military meteorological offices, local radio and television stations, and private-service vendors). The warnings and advisories are also channeled to the "Family of Services" medium, which provides external user access to near real-time weather and hydrologic data and information through a dial-up service.

The NEXRAD network must be considered in the context of the modernized weather service, whereas the pre-NEXRAD radar network must be considered in the context of the former structure. The technical features of the NEXRAD allow the development and provision of new products and services that were, heretofore, unavailable. Many of the new NEXRAD products are available to users from the NEXRAD information dissemination service providers. The number and breadth of the automated products and forecasting aids have increased considerably, thereby adding to the complement of former products and services. Improvements in these radar products and services bring the overall NWS modernization another step closer to its goal of providing the nation with more timely and accurate warning of hazardous weather and flooding.

Appendix B

Documents Requesting NRC Study

Letter from Ronald H. Brown, Secretary of Commerce to Robert M. White, President, National Academy of Engineering

Letter from Ronald H. Brown, Secretary of Commerce to George E. Brown, Chairman, Committee on Science, Space and Technology

Letter from D. James Baker, Undersecretary for Oceans and Atmosphere to Robert E. Cramer, Congressman from Alabama

NOAA Study Guidelines. (Internal document to address congressional inquiries on NEXRAD Coverage.)

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

AUG 1 8 1994

Dr. Robert M. White
President, National
Academy of Engineering
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Dear Dr. White:

As we rapidly move to full modernization of the National Oceanic and Atmospheric Administration's National Weather Service, it is essential that we ensure that the deployment of the new technology (NEXRAD, GOES, etc.) continues to provide no degradation of service. As indicated in the enclosed letter to Chairman George Brown, a number of communities are concerned about their coverage.

The Chairman has asked that I commission an independent review to assess the adequacy of NEXRAD coverage from a scientific and technical standpoint, in terms of the "no degradation of service" requirement of the Weather Service Modernization Act, Public Law 102-567, and that the National academy of Science's National Weather Service Modernization Committee is the right group. I concur, and would like to use this letter to formally ask for the study. The contact point for the Department of Commerce on this topic will be D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere.

We look forward to an expeditious review.

Sincerely,

Ronald H. Brown

Ronald H. Brown

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

AUG 18 1994

The Honorable George E. Brown, Jr.
Chairman, Committee on Science,
Space, and Technology
House of Representatives
Washington, D.C. 20515-6301

Dear Mr. Chairman:

Thank you for your letter regarding adequacy of Next Generation Weather Radar (NEXRAD) coverage for the Nation. I share your confidence that the overall National Weather Service (NWS) modernization plan is sound. I, too, have heard from a number of communities concerned about the adequacy of NEXRAD coverage for their area. Many of these are from the areas listed in your letter.

I endorse your request that an independent review is needed to assess the adequacy of NEXRAD coverage from a scientific and technical standpoint, in terms of the "no degradation of service" requirement of the Weather Service Modernization Act, Public Law 102-567. I also agree that the National Academy of Sciences' National Weather Service Modernization Committee (NWSMC) is the appropriate body to conduct this assessment. D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere, has already had preliminary discussions with the Academy and its NWSMC. He has informed me that the Academy is prepared to undertake the study and is ready to move expeditiously. Therefore, I will formally ask them to conduct the study.

Your interest in the NWS is appreciated.

Sincerely,

Ronald H. Brown

Ronald H. Brown

UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

October 5, 1994

The Honorable Robert E. Cramer
House of Representatives
Washington, D.C. 20515

Dear Congressman Cramer:

As a result of our discussion in Vice President Gore's Office about HR 4998, the Weather Service Modernization Performance Review Act of 1994, I have reviewed the National Oceanic and Atmospheric Administration's (NOAA) actions as it moves ahead with the modernization of the National Weather Service. As I told you, I am confident that NOAA is proceeding in a manner that fully complies with the requirements of the Weather Service Modernization Act. I am also confident that, when the process is complete, the Nation will have the most efficient and effective Weather Service in the world.

However, you and representatives from some other areas are concerned that weather coverage in the future will not meet the requirements of the law. You have requested an independent assessment to ensure that this does not occur, particularly as we decommission outmoded radars and eventually consolidate some local offices into the fully modernized offices of the future.

I am pleased that we have been able to work with you to develop a mechanism to provide an independent scientific assessment of NEXRAD coverage in the modernized Weather Service. We have also agreed on a procedure to establish the criteria necessary to assure that weather services will not be degraded as we decommission obsolete radars, and to provide the public with an opportunity to participate in the process.

Sufficient time no longer remains in this Congress to enact legislation. However, I am convinced that application of the procedures we discussed will achieve our goals of assuring the public that no one will be put at risk of degraded weather services as modernization proceeds, while minimizing any resultant delay in the modernization process which is so

THE ADMINISTRATOR

essential to public safety. Therefore, we will put into place the procedures contained in the enclosed document. This will put into effect our discussions without the need for legislation.

Implementation of these procedures will instill public confidence in the modernization process and thereby contribute significantly to the national interest. Thank you for your participation in this effort.

Sincerely,

D. James Baker

Enclosure

STUDY GUIDELINES

(This is an internal NOAA document)

Section 1:

(a) Modernization of the NWS is essential to public safety and should proceed without unnecessary delay.

(b) The WSMA establishes procedures that assure that the modernization of the NWS will not result in the degradation of weather service currently provided to the public but these procedures do not provide for the independent review of decisions until shortly after the actual event; and

(c) It is appropriate to review the adequacy of the nation's overall NEXRAD coverage, to ensure a solid scientific and technical basis for the decision making process, and to assure meaningful participation by the public.

Section 2:

The purposes of this document are to provide the fullest opportunity for public participation in the modernization process without unduly delaying this process: and to ensure, through the application of independent scientific criteria that weather services provided in each service area will not be degraded as obsolete radars are decommissioned or as field offices are closed, consolidated, relocated or automated.

Section 3:

The definitions contained in Section 702 of the WSMA shall apply to the terms in this document. In addition, the term "area of concern" means a service area identified in a timely public comment in response to the Federal Register notice required by section 4 of this document.

Section 4:

Within 30 days the Secretary shall publish a notice in the Federal Register requesting comments on service areas where it is believed that current weather services may be degraded as existing radars are decommissioned or as field offices are closed, consolidated, automated or relocated. The notice shall allow 60 days for the submission of comments. Persons submitting comments shall state the basis for their belief as fully as possible, and shall include a description of local weather characteristics (including unique weather phenomena) and weather related concerns which involve a substantial threat to public safety which they believe affect the weather services provided in areas of concern. All comments received by the Secretary shall be provided promptly to the NRC.

Section 5:

(a) Within 30 days the Secretary shall contract with the NRC, or amend an existing contract as necessary, to conduct an independent scientific assessment of proposed NEXRAD radar coverage and consolidation of Field Offices in terms of "no degradation of services" and to establish criteria for identifying service areas where the decommissioning of existing radars could degrade service to affected users.

(b) Within 180 days,but not earlier than 60 days after the close of the comment period provided in the Federal Register notice of section 4, the NRC shall furnish to the Secretary the assessment and criteria required by subsection (a) together with recommendations regarding the need and timing for any future independent studies by the NRC.

Section 6:

(a) After receipt of the NRC report, the Secretary shall apply the NRC criteria and other applicable criteria previously approved by the NRC pursuant to the WSMA to areas of concern and, taking into account the comments received in response to the Federal Register notice of section 4, identify those where he/she believes that actions to decommission a radar or to close, consolidate, relocate, automate a field office noted in the current version of the NIP are not likely to satisfy the requirements of the WSMA. The Secretary shall report the results of his/her review to the Committee on Commerce Science and Transportation of the Senate and the Committee on Science, Space and Technology of the House of Representatives. If the Secretary believes that additional radars are needed to satisfy the requirements of the WSMA, he/she shall also identify the number and location of the radars needed.

(b) Submission of a report under this section shall not relieve the Secretary from the requirement of section 706(b) of the WSMA to certify no degradation of service when she/he restructures a field office. If the field office is located in an area of concern, the Secretary shall provide all comments relating to that area of concern received pursuant to section 4 to the MTC during the certification process.

Section 7:

(a) The Secretary shall not close, consolidate, relocate, or automate any field office or decommission any NWS radar until the public has had an opportunity to identify areas of concern.

(b) Regardless of the contents of the most recent NIP, the Secretary shall not decommission a radar or close, consolidate, automate or relocate a field office in an area of concern unless-

    (1) The Secretary has reported to the Congress as provided in section 6 that he/she believes that the action contemplated would not result in a degradation of service: and

    (2) 30 days have expired from the date the report was submitted to Congress.

Appendix C

National Research Council's Statement of Task for the Panel on the Adequacy of NEXRAD

Based on tasking from the Department of Commerce to the National Academy of Sciences/National Academy of Engineering, the National Weather Service Modernization Committee's Panel on the Next Generation Radar (NEXRAD) of the National Research Council will:

Examine and assess the adequacy of NEXRAD coverage for the nation from the scientific and technical standpoint, in terms of the "no degradation of service" requirement of the Weather Service Modernization Act, October 1992. As defined by section 702 (4) of Public Law 102-567, "degradation of service means any decrease in or failure to maintain the quality and type of weather services provided by the National Weather Service to the public in a service area, including but not limited to a reduction in existing weather radar coverage at an elevation of 10,000 feet."

Subtasks:

A. Review the specifications of the NEXRAD and NEXRAD network coverage.

B. Examine the performance of the operational NEXRADs in relation to their coverage and their ability to detect significant weather.

C. Establish criteria for evaluating the adequacy of coverage of the pre-NEXRAD and the proposed NEXRAD network and areas for decommissioning of existing radars.

D. Examine and evaluate the adequacy of coverage of the pre-NEXRAD network and the proposed NEXRAD network.

The findings and recommendations will be provided in a report targeted at the leadership of NWS, NOAA, and DOC, as well as at Congress and others.

Appendix D

Drawings and Descriptions of Weather Phenomena

The following drawings illustrate weather phenomenon features and, where applicable, show typical reflectivity patterns as displayed on weather radars. The drawings are listed in the order that weather phenomena are presented in Tables 2-1 and 2-2.

HURRICANE

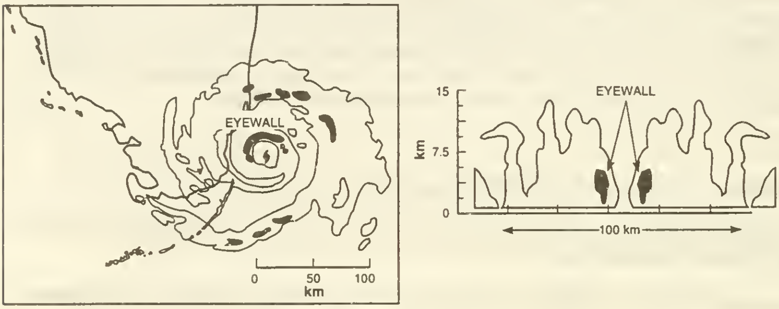

Figure D-1 The hurricane eye wall. This is the area of tall cumulonimbus storms surrounding the eye of the storm. Heavy rain and very high winds occur in the eye wall. The "eye of the storm" (hurricane, typhoon) is the roughly circular area of comparatively light winds and fair weather found at the center of a severe tropical cyclone. Based on data from Marks, 1990.

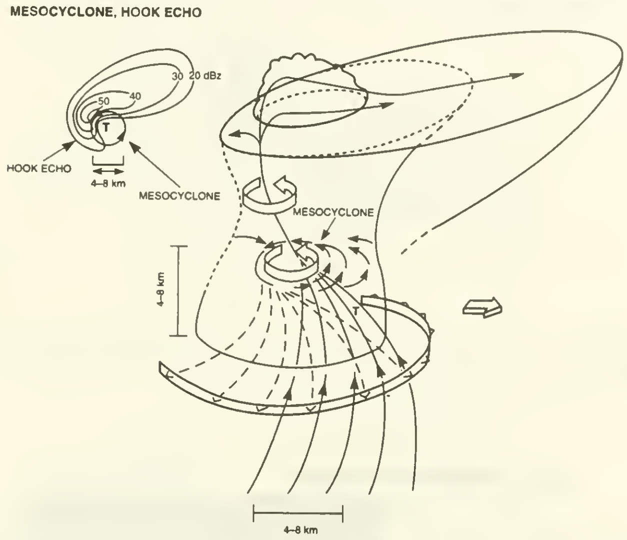

Figure D-2 Mesocyclone and hook echo. The mesocylone is a horizontal atmospheric rotation on a scale between 4 km and 400 km (Fujita, 1981). The hook echo is a pendant, curved-shaped region of reflectivity caused by precipitation being drawn into the cyclonic spiral of a mesocyclone (Davies-Jones, 1985). The hook echo is a fairly shallow feature, typically extending only up to 4 km in height.

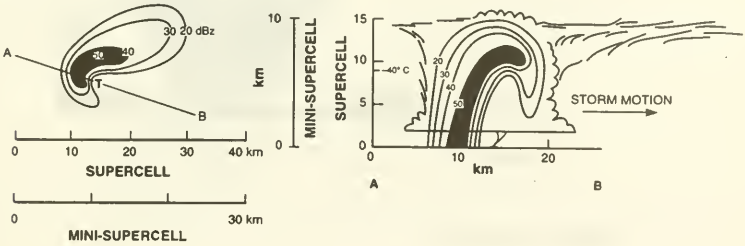

Figure D-3 Supercell and mini-supercell. The supercell is potentially the most dangerous convection storm type. The supercell may produce high winds, large hail, and long-lived tornadoes over a wide path. In its purest form the supercell consists of a single quasi-steady, rotating updraft that may have a lifetime of several hours (Weisman and Klemp, 1986). The radar-identified rotation typically has a diameter of 4 km to 12 km. The mini-supercell contains similar severe weather characteristics but the storm is significantly smaller in height and width. The diameter of the radar-detected rotation is 1 km to 8 km. This is a relatively new storm type whose existence has been confirmed by data from the new Doppler radars in the eastern half of the United States. Differentiating on a scale is useful here because of the greater difficulty in detecting these smaller rotations. Based on data from Burgess and Lemon, 1990; Davies-Jones, 1985 .

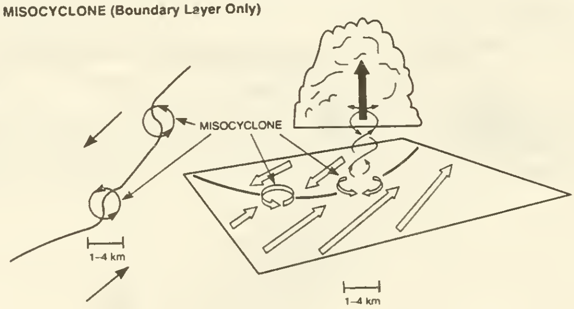

Figure D-4 Misocyclone. The misocyclone is a horizontal atmospheric rotation on a scale between 40 m and 4 km. Based on data from Wakimoto and Wilson, 1989; Fujita, 1981.

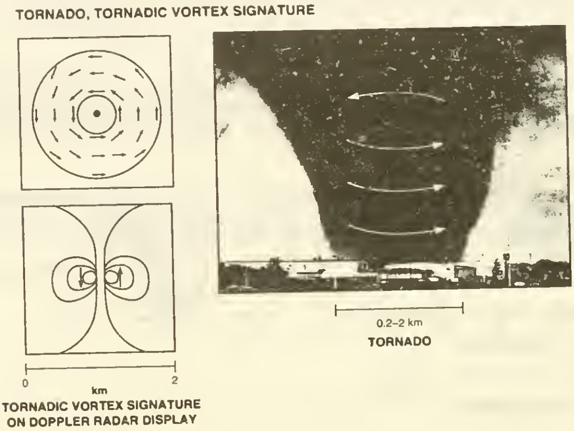
TORNADO, TORNADIC VORTEX SIGNATURE
0
2
km
TORNADIC VORTEX SIGNATURE ON DOPPLER RADAR DISPLAY
0.2–2 km
TORNADO

Figure D-5 Tornado vortex signature (TVS). The TVS is a Doppler velocity signature sometimes produced by a large, intense tornado at close range. The signature is a very strong azimuthal shear in a distance < 2 km. Based on data from Brown and Wood, 1987; Simon, 1988.

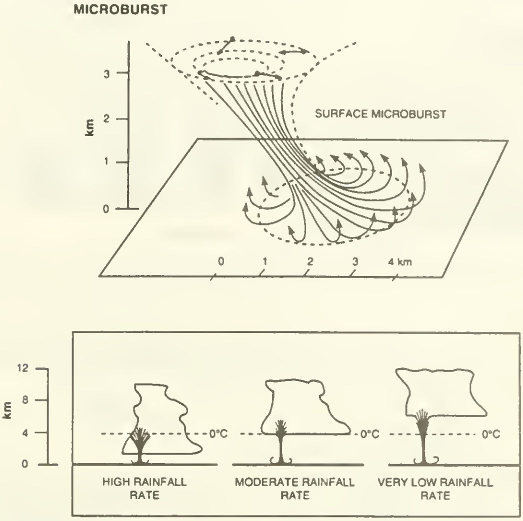

Figure D-6 Microburst. The microburst is a strong down draft that induces an outburst of damaging winds on or near the ground. Damaging winds, either straight or curved, are highly divergent. The damaging winds extend over an area of less than 4 km and typically last only a few minutes. This scale of diverging winds has been found to be particularly hazardous to aircraft landing or taking-off. Microbursts can be associated with widely varying surface rainfall rates. Based on data from Fujita, 1981, 1985.

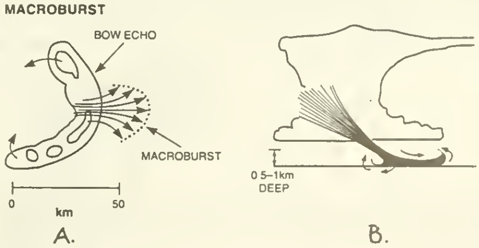

Figure D-7 Macroburst. The macroburst is similar to the microburst except the damaging winds extend over an area greater than 4 km and may last for tens of minutes. The term "downburst" includes both microbursts and macrobursts without reference to scale.

Side A. Reflectivity signature—Several reflectivity patterns have been associated with macrobursts. One of the most common is the "bow echo" (depicted on the left side of the figure), or region in a line of thunderstorms that bulges ahead of the line, and is associated with damaging surface winds, and occasionally tornadoes.

Side B. Velocity signature—The velocity signature of a macroburst shows a broad pattern of approaching and receding velocities associated with the strong divergent storm outflow, depicted on the right side of the figure. Based on data from Fujita, 1981, 1985.

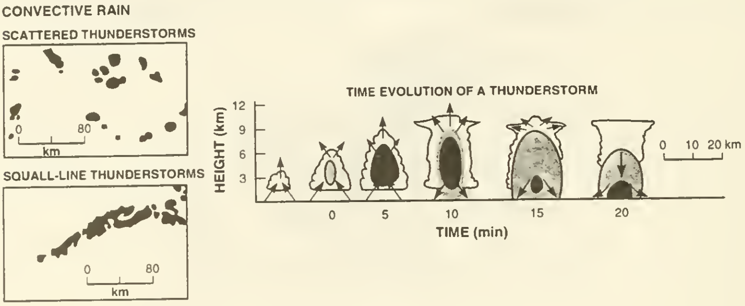

Figure D-8 Convective rain. Convective rain is associated with convective clouds or cumuliform clouds characterized by vertical development in the form of rising mounds, domes, or towers. Based on data from Byers and Braham, 1949; Burgess and Lemon, 1990.

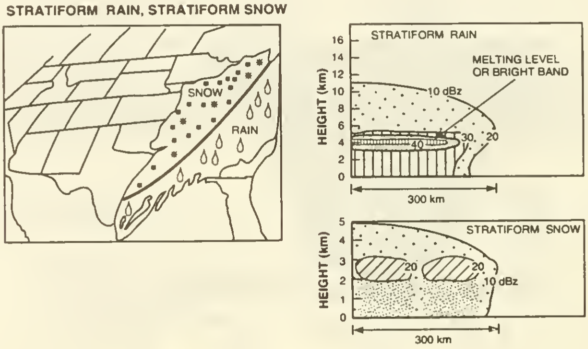

Figure D-9 Stratiform rain. Stratiform rain is horizontally widespread in character, typically associated with macroscale fronts and pressure systems. Stratiform snow has the same features as stratiform rain except precipitation is in the form of snow. Based on data from Weber and Wildrotter, 1981; Marks, 1990.

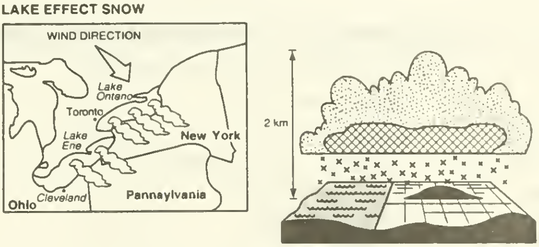

Figure D-10 Lake-effect snow. Lake-effect snow is localized snow that occurs over and in the lee of lakes. Lake-effect snow is caused by relatively cold air flowing over warm water. In the United States, this phenomenon is most noted along the south and east shores of the Great Lakes during arctic cold-air outbreaks.

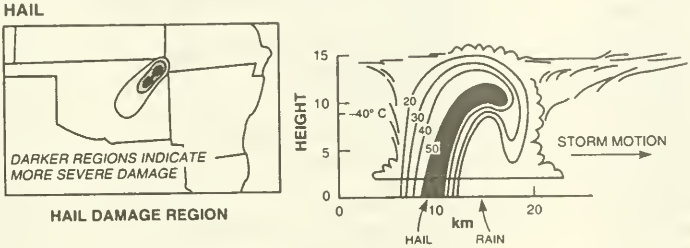

Figure D-11 Hail. Hail is precipitation in the form of balls or irregular lumps of ice that is always produced by convective clouds, nearly always cumulonimbus. An individual unit of hail is called a hailstone. By convention, hail has a diameter of 5 mm or more, while smaller particles of similar origin may be classed as ice pellets or snow pellets. The figure on the left shows a large hail damage region, and the figure on the right shows a vertical cross-section of the hail shaft in a supercell storm. Based on data from Burgess and Lemon, 1990.

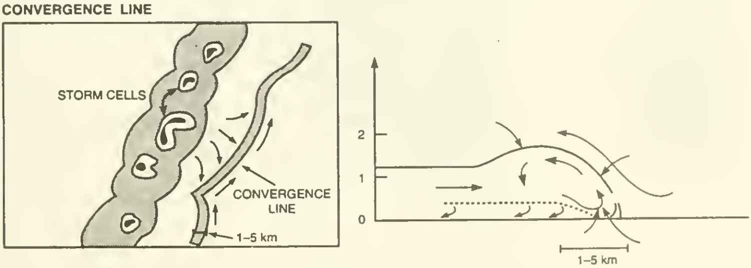

Figure D-12 Convergence line. The convergence line is a horizontal line along which horizontal convergence of the air flow is occurring. Common forms of convergence lines are sea-breeze fronts, cold-air outflows from thunderstorms, and macroscale fronts. The left side of the figure shows a convergence line ahead of a line storm caused by the pooled cold-air outflow from many storm cells in the line. The figure on the right shows a vertical cross-section of the leading edge of the convergence line. Based on data from Klingle et al., 1987.

Appendix E

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Appendix F

Distance of Old Radar from Nearest NEXRAD in Descending Order by Distance

Location of Old Radar	Distance to Nearest NEXRAD (km)
Williston, ND	207
Alliance, NE	186
Chattanooga, TN	183
Fort Wayne, IN	170
Huntsville, AL	164
Erie, PA	153
South Bend, IN	147
Fort Smith, AR	143
Waterloo, IA	142
Evansville, IN	140
Columbia, MO	134
Cape Hatteras, NC	133
Victoria, TX	133
Athens, GA	132
West Palm Beach, FL	129
Baton Rouge, LA	128
Apalachicola, FL	127
Meridian, MS	126
Daytona Beach, FL	125
Charlotte, NC	123
Huron, SD	120
Bristol, TN	119
Norfolk, NE	115
Harrisburg, PA	115
Volens, VA	114
Concordia, KS	109
Hondo, TX	109
Hartford, CT	106
Rochester, MN	105
Patuxent River, MD	104
Chatham, MA	103
Columbus, OH	103
Augusta, GA	102
Waco, TX	100

Location of Old Radar	Distance to Nearest NEXRAD (km)
Pensacola, FL	96
Waycross, GA	96
New York City, NY	95
Alpena, MI	93
North Platte, NE	92
Stephenville, TX	92
Limon, CO	91
Cincinnati, OH	83
Charleston, SC	80
Columbus, GA	79
Fargo, ND	79
Beckley, WV	79
Los Angeles, CA	78
Longview, TX	77
Grand Island, NE	73
Worcester, MA	70
Kansas City, MO	69
Garden City, KS	68
Madison, WI	68
Akron, OH	66
Muskegon, MI	64
Montgomery, AL	63
Wichita Falls, TX	63
Savannah, GA	61
Houghton Lake, MI	61
Monett, MO	59
Tupelo, MS	57
Wilmington, NC	57
Atlantic City, NJ	57
Marseilles, IL	56
Austin, TX	56
Centreville, AL	54
Detroit, MI	54
Topeka, KS	53
Las Vegas, NV	49

Location of Old Radar	Distance to Nearest NEXRAD (km)
Neenah, WI	47
Springfield, IL	44
Abilene, TX	42
Tucson, AZ	39
Phoenix, AZ	37
Raleigh, NC	37
Atlanta, GA	36
Galveston, TX	34
Tulsa, OK	31
Portland, OR	31
Oklahoma City, OK	30
Louisville, KY	29
Omaha, NE	29
Macon, GA	28
Portland, ME	27
Minneapolis, MN	27
Albany, NY	27
Memphis, TN	25
Des Moines, IA	23
Rapid City, SD	21
Moline, IL	19
Sacramento, CA	18
Miami, FL	18
St. Louis, MO	14
Charleston, WV	13
Slidell, LA	10
Billings, MT	8
Key West, FL	7
Burlington, VT	5
Brownsville, TX	3
Paducah, KY	2
Lake Charles, LA	2
Shreveport, LA	2
Buffalo, NY	2
Lubbock, TX	2
San Angelo, TX	2

Location of Old Radar	Distance to Nearest NEXRAD (km
Indianapolis, IN	1
Goodland, KS	1
Duluth, MN	1
Columbia, SC	1
Corpus Christi, TX	1
Mobile, AL	0
Little Rock, AR	0
Tampa, FL	0
Wichita, KS	0
Jackson, KY	0
Marquette, MI	0
Jackson, MS	0
Missoula, MT	0
Bismarck, ND	0
Binghamton, NY	0
Cleveland, OH	0
Medford, OR	0
Pittsburgh, PA	0
Sioux Falls, SD	0
Nashville TN	0
Amarillo, TX	0
Midland, TX	0
Cheyenne, WY	0

Mr. ROHRABACHER. I appreciate that, Mr. Gordon.

Let me just note that the radar coverage that we just heard about, the degradation of a number of places, one was northwest North Dakota. That happens to be the place where I spent the night in the root cellar.

So, realizing that that is an important thing for those people who live in northwest North Dakota, and when Dr. Friday mentions that the average now of lead time, we are in a plus situation where we have actually some situations where the average notification is ahead of the event, Mr. Cramer's amendment which was passed and will become part of law and which Congress is insisting upon, is that the average is important but that in each individual case there be no degradation because at times you can have an "average" that is greatly improved, but we are not going to leave anybody out. We want to make sure that nobody is left out.

Mr. Brock, would you like to move on from there?

STATEMENT OF MR. JACK L. BROCK, JR., DIRECTOR, DEFENSE INFORMATION AND FINANCIAL MANAGEMENT SYSTEMS, ACCOUNTING AND INFORMATION MANAGEMENT DIVISION, UNITED STATES GENERAL ACCOUNTING OFFICE, WASHINGTON, D.C. ACCOMPANIED BY: RANDOLPH C. HITE, ASSISTANT DIRECTOR, ACCOUNTING AND INFORMATION MANAGEMENT DIVISION, U.S. GAO

Mr. BROCK. Thank you, Mr. Chairman.

On a personal note, I spent several evenings in my grandmother's root cellar, who lives 14 miles west of Vernon, Texas, in Mr. Thornberry's District. As I child, I grew up in Plainview, Texas, and experienced many radar warnings.

My grandmother, who is 97 years old and lives by herself, absolutely depends upon weather forecasts in the summer. She is terrified of a tornado hitting her house. She has the television on as background noise virtually all day long.

I think that is a fairly common occurrence in that area of the country where there are no local radio stations, and some of the warning techniques are still rather in an infant stage, and the Weather Service plays a very vital part.

Secondly, I would like to commend the National Weather Service. They are introducing, or have introduced, a technology that works. As a result of that technology, they are really improving the ability of the government to save lives.

I think we can see from the panels today and the interest on both sides that this is a nonpartisan issue; that everyone wants to save lives, and we are doing it with proven technology.

The two issues that we are really concerned about that we are here today for, one has been addressed by the previous panel. The technology is great. For it to be great, for it to be effective, it has to be up and running and it has to be located in the right area.

The first panel addressed, as did my colleagues here on my right, addressed that issue of coverage. Are the radars in the right places? Are they providing the type of coverage within the Continental United States that is necessary?

Like others, we are waiting for the results of the National Weather Service review. I think those issues have been fairly well laid out.

What I would like to summarize—and if I could, please, sir, have my entire statement put in the record?

Mr. ROHRABACHER. Without objection.

Mr. BROCK: —is the second issue of availability.

Even in those areas that are served by the NEXRAD, there is a question of availability there. That is, how often are they up and running?

If they are not up and running, they are not able to provide any sort of weather information.

The National Weather Service and the Air Force have established a mutually agreeable standard that radars will be up and available 96 percent of the time. That is roughly 23 hours a day, if you did it on a daily basis, that the radars would be up.

Unfortunately, this standard is not being met. Recent statistics indicate that at the National Weather Service 85 percent of their sites met this standard. Of the 90 sites, 13 sites did not meet that 96 percent availability standard. Their up-time ranged from 83 to 95 percent.

Mr. ROHRABACHER. Mr. Brock, if I could interrupt for one second here, even with a 96 percent standard, if that 4 percent of the time that they are not up happens to be the time that they are in the middle of a storm because the tornado has knocked out the electricity, which is what we heard from Mr. Thornberry, even the 96 percent is not helpful if a storm comes up and knocks it out at the time it is needed.

Mr. BROCK. That is correct.

Just by point of contrast, FAA has a 99.7 percent rate of being up. The Air Force is not performing at that level. For the last three months, its up time was that 65 to 80 percent of its sites met that standard.

The latest month that we had available in August, 5 of their 20 sites did not meet the 96 percent standard. Their range for those 5 sites was from a low of 17 to a high of 94.

Now when we looked at the problem of availability at these sites, one of the biggest problems that we have seen is the lack of an uninterruptable power supply. This is a backup power supply, and I believe that Mr. Thornberry referred to it during his statement, that in the event that the power is knocked out at an installation, that a battery-powered supply would come along and provide the installation with uninterrupted power.

Now for some reason that was not put in the original installations. This did not make any sense to us. I know from my own experience, and I am sure that other people here have experienced it, that during a storm it is not unlikely that your power will go out. In fact, this occurs on a reasonably frequent basis at the radar installations.

They are now planning—the National Weather Service and the Air Force—are now planning a retrofit to provide UPS at all sites. It costs about $125,000 a site.

Unfortunately, that decision has been deferred for a year, and it will not be completed—the retrofit will not be completed until 1999 for the Air Force, and the year 2002 for the National Weather Service.

Mr. ROHRABACHER. What is the overall cost of that, per site?

Mr. BROCK. The $125,000, if you multiplied it by the 163 sites, which I am sure that my colleague, Mr. Hite here will do in a rather rapid form, we can tell you that. It is not a large amount.

Mr. ROHRABACHER. Are you talking about $10 million?

Mr. BROCK. I am hearing $20 million down at the end of the table.

Mr. ROHRABACHER. Is it a $20 million cost? Again, and I am going to take the Chairman's prerogative while he is looking up the exact number, that when you are talking about a $20 million figure here, this is why we have to set priorities.

If in the middle of storms a radar is going out and our ability to track these storms is going out because we do not have a backup supply of electricity, this is much more important than some other items that we might have in the budget where people's lives are not at stake.

That is why it is important for us, when we are going about in handling the budget deficit, that we set the priorities in areas where people's lives are at stake. This is one of those areas.

So you might—Did you find that figure for me yet? What was that?

Mr. BROCK. We multiplied it out to be $14.5 million.

Mr. ROHRABACHER. $14.5 million. That is another reason why we should not be trying to cut the budget across the board, because if we say this is a $14 million program and we are going to cut everything by 10 percent or 20 percent, that just means a certain number of areas are not going to get their coverage and are going to be vulnerable to having their power out.

I am sorry for making that point for the third time today, but I think that when we are dealing with people's lives and important issues like this that we need to put it in perspective to what the budget process is all about.

Go ahead, Mr. Brock.

Mr. BROCK. One of the other concerns that we had on the availability of data is that we found consistently both within the Air Force and within the National Weather Service that frequently this number was overstated.

In other words, the percentage of downtime might even be greater than indicated.

One of the interesting things on the UPS which we believe is one of the primary concerns on availability is that the National Weather Service made a conscious decision to trade off buying the additional FAA radars—which they got a good deal on those radars—and as a result that was one of the reasons that they had to postpone putting in the UPS.

Now this was a decision that they made consciously. There was a tradeoff. They had an opportunity to get the additional FAA radars, the surplus radars, at a good price. The tradeoff was pushing back the schedule for putting in the UPS, the uninterruptable power supplies.

That is a question we would have. Were those contingencies adequately weighed when those decisions were being made?

We are not sure that always when you are making tradeoff decisions that way if the full range of alternatives was reviewed.

Just to briefly summarize our statement and our position, Mr. Chairman, we think that Congress, and we think the public should take a great deal of comfort in the fact that the NEXRAD era does offer expanded breadth and clarity of the national weather radar coverage.

However, we believe that important questions are still open. That is, will any gaps in coverage continue to exist under the current siting scheme?

The answer to this is not within us but within the National Weather Service and in their review within the Department of Commerce.

And, will the radars, once deployed, be available when they are needed?

This depends in large part on getting the UPS in place at the current and planned radar sites.

That concludes my statement, Mr. Chairman.

[The prepared statement of Mr. Brock follows:]

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Energy and the Environment,
Committee on Science, House of Representatives

For Release on Delivery
Expected at
1:00 p.m.
Tuesday,
October 17, 1995

WEATHER FORECASTING

Radars Far Superior to Predecessors, but Location and Availability Questions Remain

Statement of Jack L. Brock, Jr.
Director, Defense Information and Financial Management
Systems, Accounting and Information Management Division

Mr. Chairman and Members of the Subcommittee:

We appreciate this opportunity to testify on the National Weather Service's (NWS) new Doppler radars, commonly called Next Generation Weather Radars or NEXRADs. This national network of radar systems truly represents a giant step in weather observing capability over the radars' predecessors. In particular, NEXRADs can better peer into weather events and extract the data forecasters need to understand the event's makeup and movement. In addition, NEXRADs provide forecasters with a much wider area of radar coverage than heretofore existed. Simply stated, NEXRADs have replaced weather event "nearsightedness" with "20/20 vision," and have given NWS the ability to save lives and money through more accurate and timely warnings of severe weather.

To perform effectively, NEXRADs must be located "in the right place" and available "at the right time," meaning that the radars must be sited to provide adequate national coverage and, once sited, they must be "up and running" when needed. Unfortunately, it is unclear whether this first requirement is being met because NWS has yet to report the results of its study on the adequacy of NEXRAD coverage, although it plans to next month. What is clear, however, is that the second requirement is not being met. That is, many NWS and Air Force NEXRADs are not available nearly as often as they are required to be. Further, a radar upgrade to address one cause of unavailability--namely, lack of an uninterruptible power supply or UPS--is not to be completed for several years.

NEXRAD: A Brief Overview

NEXRAD is a Doppler radar system[1] that is being acquired jointly by NWS, the Air Force, and the Federal Aviation Administration (FAA). Together, these agencies plan to deploy 161 NEXRADs--119 for NWS, 30 for the Air Force, and 12 for FAA--at an estimated cost of just over $1.4 billion. Of the 161 planned radars, 138 operational systems are to be located within the contiguous United States (CONUS)[2]--116 at NWS sites and 22 at Air Force and Army sites. To date, a reported $1.2 billion has been spent and 132 radars have been deployed, 124 of which are CONUS-based--102 at NWS sites and 22 at Air Force and Army sites.

NEXRADs Are a Giant Leap Beyond the 1950s Technology They Are Replacing

NEXRADs provide more breadth and clarity of coverage than the radars they are replacing. Before the introduction of NEXRAD, NWS operated and maintained 128 1950s vintage radars. These radars, many of which rely on vacuum-tube technology, collectively covered roughly one-half of CONUS. In contrast, the CONUS-based NEXRAD network is to consist of 138 Doppler radars and provide coverage of almost all of CONUS. Additionally, according to the National Research Council (NRC), the positioning of the radars will for the first time provide complete coverage of areas prone to hurricanes, not to mention better coverage in areas subject to other severe weather phenomena, such as lake-effect snows. Further, with NEXRAD, coverage of atmospheric layers will be increased because changing the old radars' elevation angle for a given rotation required manual intervention. NEXRADs, on the other hand, can observe different atmospheric layers faster because they automatically scan multiple elevation angles.

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[1] Doppler radar is used to determine the speed and direction of rain or snow particles, cloud droplets, or dust moving toward or away from the radar. The radar accomplishes this by sending out a pulse using a stable frequency and then measuring the changing frequencies as the distances between the radar and the object changes.

[2] CONUS consists of all states except Alaska and Hawaii.

With respect to coverage clarity, NRC also reported that NEXRADs meet or exceed their technical design specifications relevant to weather detection, and that they are ten times more sensitive and have better resolution than their predecessors. Additionally, whereas the old radars could only provide a picture at a specific point in time and space, the NEXRADs allow forecasters to see the movement of weather because the Doppler technology detects the movement of precipitation, cloud droplets, and dust in the air. As a result, NRC concluded that NEXRADs allow unprecedented short-term forecasting of thunderstorms, damaging winds, and tornadoes.

Overall, NWS has reported that NEXRADs have improved the accuracy and timeliness of severe local storm and flash flood warnings. In particular, NWS notes that lead times for tornado warnings have improved by an average of 4 minutes because of NEXRAD. A comparison of two similar California flood disasters, one in 1992 that was watched by the old radars and one in 1995 that was observed by NEXRADs, illustrates clearly the value of this increased warning time. In the 1992 incident, the radars were unable to detect small-scale, yet intense storms in a timely fashion. As a result, warnings and advisories were not issued until, and even after, severe flooding had already occurred. These small storms produced 8 inches of rain, and sadly resulted in the loss of human lives. In contrast, warnings and advisories were issued 3 to 6 hours in advance of the 1995 storms and flooding, allowing emergency crews to close at-risk roads and preventing any loss of life.

Final Decision on Radar Locations Pending As NWS Considers Adequacy of Coverage Issues

According to NWS, its current NEXRAD location plans will provide national radar coverage that is equal to or better than existing coverage. However, public concern last year over relocating NWS radars prompted the leadership of the House Committee on Science, Space, and Technology (now the Committee on Science) to request NRC to review the adequacy of NEXRAD's national radar coverage. In response, in June 1995, NRC reported that coverage under the NEXRAD network may be degraded over existing service in five geographic areas and recommended further study of each area.

The Secretary of Commerce acted quickly on this recommendation by forming a departmental team of experts in meteorological operations and Doppler weather radar technology to study the 5 areas, as well as 27 others identified as possibly experiencing degraded service. This study has been completed and reviewed by a group of university experts; however, NWS has been unwilling to discuss the study's results until the Department of Commerce grants it approval to do so. NWS plans to release the final report in early November 1995.

Whether Radars Will be Available When Needed Remains an Uncertainty

Because severe weather can occur suddenly at any hour of the day or night, NEXRADs are required to be "up and running" at least 96 percent of the time.[3] Regrettably, they are not. In May 1995,[4] we reported that between 10 and 62 percent of the Air Force's NEXRADs were falling short of this requirement each month. In fact, at some locations, NEXRADs were unavailable for an entire month, and at other locations, we found that the Air Force's availability data were likely overstated. To make matters worse, we found that NWS did not even know if its radars were meeting the availability requirement because it was not monitoring availability on a site-by-site basis.

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[3] The NEXRAD Joint Operational Requirements define availability as the time that the system is operating satisfactorily, expressed as a percentage of total time (the time the system is operating satisfactorily plus the time the system is down). Downtime includes corrective and preventive maintenance time and delays encountered due to the delivery of needed spare parts. Most definitions of availability exclude scheduled downtime, such as preventive maintenance.

[4] Weather Forecasting: Radar Availability Requirement Not Being Met (GAO/AIMD-95-132, May 31, 1995).

Today, both the Air Force and NWS have initiated steps to implement our recommendations to improve NEXRAD availability data and correct any shortfalls that the data show. However, more needs to be done because NEXRAD availability remains and will likely continue to be an issue for several reasons. First, Air Force data for June 1995 through August 1995, which Air Force officials told us are now reliable because the data were validated with site officials, show that from 20 to 35 percent of Air Force NEXRAD sites are still falling short of the availability requirement each month. In fact, the availability at one of these sites during August 1995 was only 18 percent.[5]

Second, even though NWS has begun monitoring availability data on a site-by-site basis, its data for May 1995 through July 1995 show that about 15 percent of its sites are not meeting the availability requirement. Moreover, these data are likely to be overstated for the same reason we cited past Air Force data for being overstated--namely, numerous sites are reporting 100 percent availability, despite the fact that a NEXRAD fails, on average, about four times a month. NWS officials acknowledged that some sites may not be reporting all radar downtime, and stated that they are now taking steps to ensure that all radar failure data are reported.

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[5] According to the Air Force, this extremely low availability was due to a lightening strike.

Third, the NEXRADs lack an uninterruptible power supply, or UPS, which protects against unexpected power outages, because the NEXRAD program office did not expect loss of power to be a significant risk. This does not make good sense. Mission-critical systems, like NEXRAD, are typically designed with an UPS, usually batteries, that can take over temporarily when the primary power source is lost. Notwithstanding this normal design practice, the argument for why a NEXRAD should be UPS-equipped is even more compelling when one considers that the cause of most outages is severe weather--precisely when one would want to make sure that a NEXRAD is available. NWS and the Air Force now plan to retrofit their respective NEXRADs with an UPS capability at an estimated cost of $125,000 per radar. However, NWS and Air Force plans do not call for all sites to receive these retrofits until fiscal years 2002 and 1999, respectively.

NWS Has Acted Quickly in Buying Two NEXRADs From FAA

In the midst of public and congressional debate and skepticism about the adequacy of NEXRAD coverage, we reported in May 1995 that FAA bought five NEXRADs targeted for Alaska, Hawaii, and the Caribbean, which it planned to "warehouse" indefinitely because deploying them did not compete favorably with other funding priorities. We, therefore, recommended that NWS not buy additional radars to address weakness that may result from the on-going NRC study until it first assessed acquisition opportunities associated with these five radars. In September of this year, NWS bought FAA's two Caribbean radars for $4.6 million. The other three FAA radars are being installed in Alaska and Hawaii, as originally planned.

According to NWS officials, the two NEXRADs were purchased as a "hedge against inflation" and will be used to boost future replenishment spares stock at its National Logistics Supply Center. NWS estimates that this purchase will save $900,000 by offsetting spare part purchases through fiscal year 2003.[6] NWS officials also acknowledged that these radars could be used to fill holes in NEXRAD coverage should any materialize. To buy these radars, however, NWS had to use all the funds targeted for its UPS retrofit in fiscal year 1995. As a result, the start of the UPS retrofit has been delayed one year, and its completion has been delayed 3 years to fiscal year 2002.

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[6] NWS estimates that this $4.6 million investment in spares will be recovered at a rate of about $700,000 a year over the next 8 years, thus producing a savings of about $900,000 over this period. We did not independently verify this cost-savings estimate.

Without question the two FAA NEXRADs constitute a tremendous bargain, assuming they are needed. By purchasing the two, NWS could fill four gaps at a relatively minimal cost because the FAA radars can be converted into essentially four stand-alone units. Specifically, the FAA radars have a redundant configuration in order to meet FAA's more stringent 99.7 percent availability requirement.[7] Under this configuration, the two radars have dual hardware and software modules to process the radar signals into digital data and create displayable radar products. However, each radar has only one transmitter tower, pedestal, antenna assembly, and radome. The program office's estimate of the costs to convert the two FAA radars into four systems is an additional $3.8 million, making the total price for getting four NWS NEXRADs about $8.4 million.[8] This price is just over one-third the cost that NWS would have to pay to buy new systems.

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[7] FAA has a more stringent availability requirement because FAA radars are located at isolated, non-CONUS sites, and thus do not have adjacent NEXRADs providing overlapping, back-up coverage in the event one goes down.

[8] This $8.4 million only includes hardware costs. The total cost to field four systems is $15.2 million, which includes land acquisition, installation, and construction costs of $6.8 million.

NWS' decision to buy the FAA radars raises several issues. First, NWS data show current and projected spare parts inventories above requisite levels through March 1997, and these levels do not even include four radars that the NEXRAD contractor is to deliver for use as spare parts as part of a 1991 agreement with the contractor. Thus, the need for additional spares in the foreseeable future does not appear to be justified. Second, NWS has yet to acknowledge any gaps in NEXRAD coverage. Moreover, if any gaps are identified, the number of radars to be bought should be driven by the number of gaps that need to be filled. Thus, until NWS and its parent agencies decide that additional NEXRADs are required to fill gaps in coverage, the decision to buy radars in the event of gaps appears premature. Third, the decision to divert funds from the UPS retrofit carries an opportunity cost that must be considered. That is, it means sacrificing NEXRADs' ability to overcome unexpected power outages, which is a known cause of the radars' currently excessive downtime.

In summary Mr. Chairman, the Congress and the public at large should take comfort in the fact that the NEXRAD era offers expanded breadth and clarity of national weather radar coverage. However, important questions remain to be answered. Will any gaps in coverage nevertheless exist under the current siting scheme? The answer to this question is being closely held by NWS and its parent agencies and thus we do not know at this time. Will the radars, once deployed, be available when they are needed? This will depend on whether the Air Force and NWS act effectively to collect reliable availability data and address the root causes of excessive radar downtime.

Mr. Chairman, this concludes our statement. We will be happy to respond to any questions you or other members of the Subcommittee might have at this time.

(511404)

GAO
United States
General Accounting Office
Washington, D.C. 20548

Accounting and Information
Management Division

B-258872

May 31, 1995

The Honorable Robert S. Walker
Chairman
The Honorable George E. Brown, Jr.
Ranking Minority Member
Committee on Science
House of Representatives

This report responds to your request that we review the Next Generation Weather Radar (NEXRAD), a Doppler weather radar that the Departments of Commerce, Defense, and Transportation are jointly acquiring. As agreed, we focused on changes in the number of NEXRADs being deployed, contract options to purchase additional radar units, the Air Force's contribution to the national NEXRAD network, and the accessibility and availability of NEXRADS.

We are providing copies of this report to the Secretaries of Commerce, Defense, Transportation, and the Air Force; the Director of the Office of Management and Budget; and other interested congressional committees. Copies will also be made available to others upon request.

Please call me at (202) 512-6253 if you or your staff have any questions concerning this report. Major contributors are listed in appendix III.

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Executive Summary

Purpose

One needs to look no further than the evening news to appreciate how Doppler radar systems[1] are allowing forecasters to better see the makeup and movement of weather and to quickly advise the public of severe events, such as tornadoes. As part of its approximately $4.5 billion systems modernization program, the National Weather Service (NWS), a component of the National Oceanic and Atmospheric Administration (NOAA), is collaborating with the Federal Aviation Administration (FAA) and the Air Force in acquiring Doppler radar technology. This $1.4 billion radar project, known as the Next Generation Weather Radar (NEXRAD), is to establish a constellation of radars to increase the accuracy, timeliness, and credibility of hazardous weather warnings.

Recent changes to the deployment schedule, uncertainties about the need for additional radars, and questions concerning interagency cooperation prompted the Chairman and Ranking Minority Member of the House Committee on Science to request that GAO determine (1) the NEXRAD units that were dropped from the original deployment plan and the reasons they were dropped, (2) the feasibility and estimated cost of extending the NEXRAD contract to purchase additional radars, (3) the Air Force NEXRADS' contribution to the national NEXRAD network and the accessibility of the Air Force NEXRAD data to civilian forecasters, and (4) the availability of the Air Force and NWS NEXRADS. Our objectives did not include determining the adequacy of national radar coverage because the National Research Council (NRC) is reporting separately on this issue.

Background

NEXRAD is a Doppler radar system that measures wind velocity in severe weather, tracks storm movement and intensity, and generates data and imagery for forecasters and other users. NWS and the Air Force report that their experience with the data from over 100 operational NEXRADS has increased the accuracy, timeliness, and credibility of warnings of severe thunderstorms, tornadoes, flash floods, turbulence, wind shear, and other types of hazardous weather events.

NWS, the Air Force, and FAA currently plan to purchase and deploy 119, 30, and 14 NEXRADS, respectively, for a total of 163. As of February 1995, 107 radars had been deployed—81 by NWS, 22 by the Air Force, and 4 by FAA. Of the 163 planned radars, 144 are to be located at NWS and Defense sites within the conterminous United States (CONUS).[2] These CONUS sites are to provide adequate geographic coverage of national weather events, thereby collectively supporting the three agencies' respective missions. The non-CONUS radars are also to support the agencies respective missions at 19 selected locations in Hawaii, Alaska, the Caribbean, the Atlantic, the Pacific, and Korea. NWS relies on several of these 19 non-CONUS radars to provide information about approaching off-shore weather. FAA and the Air Force rely on many of these 19 radars to ensure safe aviation operations and resource protection.

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[1] Doppler radar is used to determine the speed and direction of rain or snow particles, cloud droplets, or dust moving toward or away from the radar The radar accomplishes this by sending out a pulse using a stable frequency and then measuring the changing frequencies as the distance between the radar and the object changes.

Results in Brief

Originally the three agencies planned to deploy 175 radars.[3] Recent changes to the NEXRAD deployment plan have decreased the number to 163. These changes are because of changes to agency requirements, military base closings, and funding limitations. Also, FAA and NWS officials told GAO that FAA will delay deploying five of its radars for probably more than a year because of budget constraints.

A NEXRAD contract option exists to acquire up to 20 additional radars. These radars could be as much as three times as expensive as current units because manufacturer production lines have been shut down, and restarting them would involve considerable expense. NWS officials told GAO that the 163 radars will provide coverage equal to or better than the existing coverage. The 163 radars are expected to meet the needs of the three agencies, and the agencies do not plan to acquire additional NEXRADS. Therefore, NWS has not reassessed the cost-effectiveness of acquiring additional radars under the contract option. However, the NRC study director stated that NRC expects to report on weaknesses in national coverage that may require NWS to buy additional radars, assuming that the benefits of doing so outweigh the associated cost.

According to NWS, the Air Force NEXRADs are essential to NWS' ability to issue quality forecasts and warnings because some provide the sole radar coverage for certain geographic areas, and all provide backup coverage in the event an NWS radar goes down. The Air Force does not restrict NWS forecasters' access to its radar data; however, Air Force data show that its radars are not available[4] to the extent that the three agencies agreed is necessary. To make matters worse, the Air Force availability data are unreliable and appear to be overstated. Also, NWS does not know if its individual radars are available to the extent necessary because it does not monitor radar availability by site.

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[2] The conterminous United States consists of all the states except Alaska and Hawaii.

[3] These 175 radars included 115 for NWS, 44 for the Air Force, and 16 for FAA.

[4] Available means the time that the system is operating satisfactorily, expressed as a percentage of total time

Principal Findings

Global NEXRAD Deployments Have Decreased

In 1980, NWS, the Air Force, and FAA agreed to jointly deploy 175 NEXRAD units. However, they now plan to deploy 163 units. Most of these radars will be deployed by the end of fiscal year 1996. The reduction of 12, consisting of a net decrease of 13 outside CONUS and a net increase of one within CONUS, was due to changes to agency requirements, funding limitations, and military base closures. Table 2.3 provides a complete list of sites added to and deleted from the deployment plan and the reasons for these changes.

Also, FAA plans to place 5 of its 14 radars in storage until at least fiscal year 1997, and probably longer, because higher priority funding requirements are preventing FAA from paying the costs associated with deploying these radars. While these units are not located within CONUS, and thus do not affect NWS CONUS weather coverage, NWS officials said the radars are important to NWS' ability to issue timely and accurate forecasts and warnings. For instance, two of the radars located in the Caribbean would allow NWS to better track and monitor hurricanes as they approach the United States. However, NWS does not have a mission requirement for radar coverage outside CONUS.

NWS told GAO that the national radar coverage that is currently planned is equal to or better than existing coverage. However, the Secretary of Commerce, at the request of the House Committee on Science, Space, and Technology (now the House Committee on Science), commissioned NRC to study and report on the adequacy of proposed CONUS coverage compared to the existing coverage. The NRC study director said he expects the study to identify weaknesses in coverage and potential areas where additional radars may be needed. This report is to be issued in June 1995.

Unit Cost to Acquire Additional NEXRADs Could Be Much Higher

Included in the contract for the development and acquisition of NEXRADS is an option to purchase up to 20 additional NEXRADs through August 1996. However, this option is not priced, meaning that the unit cost for each additional radar is subject to negotiation. NEXRAD program office officials estimate that, depending on the number of radars that are needed, each radar could cost as much as three times the price of current units. These officials stated that the higher unit costs would be due to breaks in production.

Program officials said they agreed to an unpriced option because no firm requirements for additional radars existed at the time the contract was negotiated. The contractor did not price the optional units because of the uncertainty of future costs (e.g., the costs of restarting subcontractor production lines).

NWS has no plans to buy additional radars, and as a result, has not reassessed the cost-effectiveness of acquiring the more expensive radars. However, NRC is expected to report on national radar coverage that may warrant a reassessment of these plans.

Air Force NEXRADs Are Integral to NWS Mission Performance and Accessible to NWS Forecasters

The Air Force NEXRADS play a critical role in NWS' overall ability to issue complete and accurate weather forecasts and warnings. Seven of the 22 CONUS-based operational Air Force NEXRADS provide primary NWS radar coverage, according to NEXRAD program office officials. Also, the Air Force radars provide important backup coverage in the event that an NWS radar providing primary coverage for a given geographic area fails, and they provide supplemental views of severe weather patterns from different angles that strengthen NWS' watch and warning capabilities. The Air Force does not restrict NWS forecasters access to its radar data.

Air Force and NWS Radars May Not Be Available When Needed

The Air Force NEXRADS may not be available when information from them is needed. A key NEXRAD requirement is that each unit should be operationally available 96 percent of the time. However, 1994 and 1995 data show that only 38 to 90 percent of Air Force radars met this requirement each month, and in fact for 9 of these months no more than 70 percent of the sites met the requirement. Moreover, this situation could be much worse because the availability information that the Air Force has been reporting is unreliable. For instance, the Air Weather Service, which monitors the Air Force's NEXRAD operations, reported that the Eglin Air Force Base radar was available 100 percent of the time from September through December 1994, based on data from Air Force maintenance data collection systems. However, base radar officials told GAO that their radar's availability ranged from 78 to 87 percent per month for these 4 months.

GAO found other examples of radar outages that were not reflected in Air Force availability data collected by the Air Weather Service.

In many cases, the Air Force NEXRAD operators and maintainers were not aware of the 96 percent availability requirement and, therefore, had no way of knowing that their performance was subpar. Inefficiencies in the Air Force's logistics process for obtaining spare parts have also made it difficult to meet availability requirements.

NWS also does not know if it is meeting the availability requirement for each of its units because it does not monitor availability on a site by site basis. Although NWS records radar downtime by site, it only uses this information to calculate the average availability of all sites, and it only monitors radar availability performance on this basis. It does not use this information to calculate and monitor site-specific availability. While GAO agrees that these aggregate data are useful in monitoring such things as spare parts usage and maintenance staffing trends, the data do not disclose whether each radar meets the required 96-percent availability requirement.

Recommendations

GAO recommends that the Secretary of Commerce direct the NOAA Assistant Administrator for Weather Services to

- not purchase additional radars to address any weaknesses in radar coverage that may result from the NRC study until assessing FAA's plans for deploying the five radars scheduled for storage and NWS' mission requirements for NEXRADS in these areas,
- ensure that any radars bought in response to NRC's national radar coverage findings are cost-beneficial, given that their unit cost could be substantially higher than those already purchased, and
- analyze and monitor system availability data on a site-specific basis for operational NEXRADS and correct any shortfalls in system availability that this analysis shows.

GAO also recommends that the Secretary of the Air Force direct the Air Force Director of Weather to improve the reliability of Air Force NEXRAD availability data and to correct any shortfalls that these data show.

Agency Comments

GAO received written comments on a draft of this report from the Departments of Commerce and Defense, and oral comments from senior

FAA officials, including the NEXRAD program manager. Commerce's written comments are in appendix I, and Defense's written comments are in appendix II.

The Department of Commerce generally concurred with GAO's findings, conclusions, and recommendations, and stated that NWS is taking steps to analyze and monitor system availability on a site-specific basis. In a draft of this report, GAO proposed that the NOAA Assistant Administrator for Weather Services assess the operational impact of FAA delays in deploying the five radars and, on the basis of this assessment, take the necessary steps to ensure that NWS' radar coverage needs are met. In their comments, the Department of Commerce and the FAA NEXRAD program manager stated that NWS does not have a mission requirement for radars outside of CONUS. GAO has incorporated this comment in the section describing FAA plans for storing five radars and has revised the recommendation accordingly.

Commerce also partially concurred with the recommendation to ensure that any radars bought in response to NRC's coverage findings are cost-beneficial. However, Commerce requested that the recommendation be modified to reflect only NWS core mission and the Weather Service Modernization Act requirements. The NRC study director told GAO that its study will only address NWS' core mission and the act and GAO, therefore, did not modify its recommendation.

The Department of Defense concurred with GAO's recommendation concerning the Air Force, and stated that it will develop management actions to improve NEXRAD availability and the reliability of Air Force data.

Contents

Executive Summary 2

Chapter 1 Introduction 12
NEXRAD: A Brief Overview 12
Objectives, Scope, and Methodology 19

Chapter 2 NEXRAD Deployments Have Been Reduced and Delayed Because of Requirements Changes, Budget Constraints, and Base Closures 22
Global NEXRAD Deployments Decreased by 12 22
CONUS NEXRAD Deployments Increased by One 23
NEXRAD Deployment Changes Due to Budget Constraints, Requirement Changes, and Base Closures 24
NRC Is Studying the Adequacy of Planned NEXRAD Coverage 25
Five FAA NEXRADs to Be Placed in Temporary Storage 26
Conclusions 26
Recommendation 27
Agency Comments and Our Evaluation 27

Chapter 3 Unit Cost of Any Additional NEXRADs May Be Substantially Higher 29
Additional NEXRADs May Cost as Much as Three Times Current Costs 29
Conclusion 30
Recommendation 30
Agency Comments and Our Evaluation 31

Chapter 4 Air Force NEXRADs Are Integral to NWS Mission Performance and Accessible to NWS Forecasters 32
Agency Comments and Our Evaluation 32

Chapter 5 Air Force and NWS NEXRADs May Not Be Available When Needed

34
Air Force NEXRADs Are Not Meeting System Availability Requirements 34
Air Force NEXRAD Operators and Maintainers Are Unaware of the Tri-Agency Availability Requirement 36
Air Force Process for Obtaining Spares Is Inefficient, but Improvements Are Underway 36
NWS Does Not Monitor Availability Data by Site 39
Conclusions 40
Recommendations 40
Agency Comments and Our Evaluation 40

Appendixes

Appendix I: Comments From the Department of Commerce 42
Appendix II: Comments From the Department of Defense 47
Appendix III: Major Contributors to This Report 48

Tables

Table 2.1: Changes to Worldwide NEXRAD Plan by Agency 23
Table 2.2: Changes to NEXRAD Plan Within CONUS by Agency 24
Table 2.3: Locations of and Reasons for Changes in NEXRAD Deployment Schedule 25

Figures

Figure 1.1: Locations of NEXRADs Within CONUS 14
Figure 1.2: Key NEXRAD Subsystems 18
Figure 5.1: Number of Air Force NEXRADs Meeting 96-Percent Availability Requirement 35
Figure 5.2: NWS and Air Force NEXRAD Logistics Processes 38

Abbreviations

ASOS	Automated Surface Observing System
AWIPS	Advanced Weather Interactive Processing System
C4	Command, Control, Communications, and Computer
CONUS	conterminous United States
DOD	Department of Defense
FAA	Federal Aviation Administration
GAO	General Accounting Office
GOES-Next	Next Generation Geostationary Operational Environmental Satellite
NEXRAD	Next Generation Weather Radar
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
NWS	National Weather Service
PUP	principal user processor
RDA	radar data acquisition
RPG	radar product generator

Introduction

Accurate and timely weather forecasts and warnings are vital to the protection of life and property. Hundreds of lives and billions of dollars in property are lost every year as a result of thunderstorms, lightning, tornadoes, hurricanes, blizzards, and floods.

The National Weather Service's (NWS) basic mission is to provide weather and flood warnings, forecasts, and advisories for the protection of life and personal property. NWS operations also support other federal missions, such as aviation safety, and our nation's commercial interests, such as the agriculture industry. The Federal Aviation Administration (FAA) and the Air Force, besides being users of NWS data and information, also collect and analyze certain weather observations to support their respective missions. FAA, for example, collects and displays weather radar, cloud ceiling, and visibility data for its air traffic controllers to use.

Since the early 1980s, NWS has been modernizing its weather observing, information processing, and communication systems to predict the weather more accurately and quickly. This approximately $4.5 billion modernization consists of four major system acquisitions and several smaller system upgrades and developments. FAA and the Department of Defense (DOD) are collaborating with NWS on two of these major acquisitions—the Next Generation Weather Radar (NEXRAD) and the Automated Surface Observing System (ASOS).[1] In addition to improved weather predictions, NWS expects the modernization to permit it to streamline its operations and downsize its organization without a degradation of service. For example, it expects to reduce its number of field offices from about 250 to 118 and to reduce staffing levels from 4,700 to 3,900.

NEXRAD: A Brief Overview

NEXRAD is a Doppler radar[2] system that measures wind velocity in severe weather, tracks storm movement and intensity, and generates data and imagery for forecasters and other users, such as air traffic controllers. NEXRAD is expected to provide improved weather radar information, thus increasing the accuracy, timeliness, and credibility for warnings of severe thunderstorms, tornadoes, flash floods, turbulence, wind shear, and other types of hazardous weather and related events. The radars are also expected to be extremely useful in analyzing a variety of other weather events, including estimating accumulated rainfall and analyzing large-scale precipitation systems.

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[1] The other two major system acquisitions are the Advanced Weather Interactive Processing System (AWIPS) and the Next Generation Geostationary Operational Environmental Satellite (GOES-Next).

[2] Doppler radar is used to determine the speed and direction of rain or snow particles, cloud droplets, or dust moving toward or away from the radar The radar accomplishes this by sending out a pulse using a stable frequency and then measuring the changing frequencies as the distances between the radar and the object changes.

NEXRAD is being acquired jointly by NWS, the Air Force, and FAA. The three agencies currently plan to purchase and deploy 163 NEXRADS—119 for NWS, 30 for the Air Force, and 14 for FAA—at an estimated cost of just over $1.4 billion—$860 million from NWS, $264 million from the Air Force, and $293 million from FAA.[3]

Of the 163 NEXRADS, 144 are to be located within the conterminous United States (CONUS),[4] 11 are to be located in Hawaii and Alaska, and 8 are to be located in the Caribbean, the Atlantic, the Pacific, and Korea. Data from these radars are shared among the three agencies to support their respective missions. For example, NWS needs adequate CONUS coverage to issue timely and accurate forecasts and warnings, and uses data from several Air Force NEXRADS to fill some gaps in coverage. Likewise, the Air Force and FAA rely on NWS radars in addition to their own to support their respective national defense and aviation missions.

On the basis of the three agencies' collective mission needs and the Weather Service Modernization Act, which mandates that the Secretary of Commerce certify that there will be no degradation in radar coverage at the 10,000 foot level prior to closing, consolidating, automating, or relocating any of NWS' field offices, the three agencies negotiated the radars' locations to meet tri-agency radar coverage requirements.[5] The locations of all CONUS radars are shown in figure 1.1.

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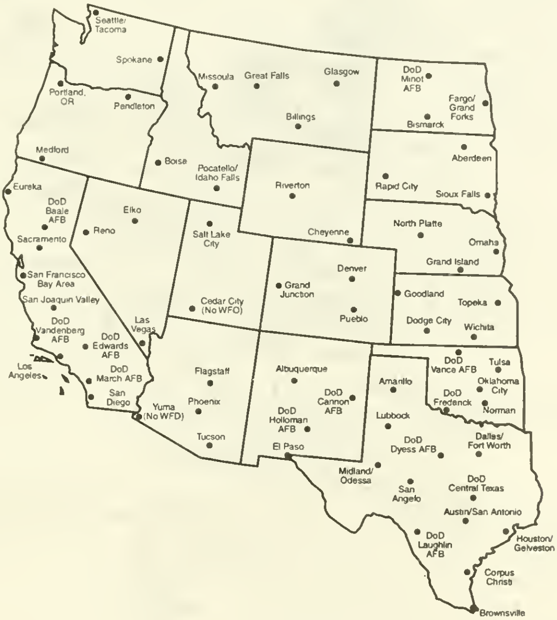
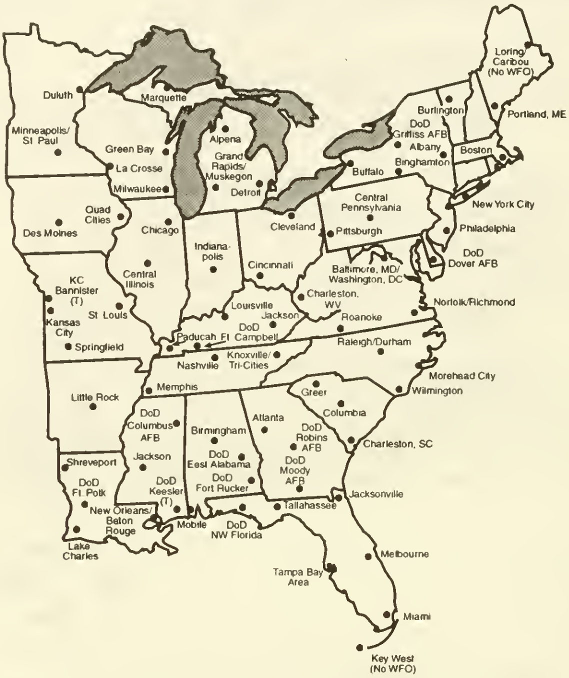
[3] The Air Force and FAA totals cover their respective NEXRADs and 2.7 percent and 20 percent, respectively, of NWS' NEXRADs due to a cost sharing arrangement agreed to by the three agencies.

[4] CONUS consists of all the States except Alaska and Hawaii.

[5] The 10,000 foot level is significant because this is the elevation at which the coverage range of an individual NEXRAD is measured. The ascending radar beam loses its reliability about 125 miles from the radar. At this distance the lowest part of the beam is approximately 10,000 feet off the ground. Therefore, each radar has a coverage diameter of 250 miles. The 250 mile cylinders were the basis for siting NEXRADs to ensure adequate CONUS coverage.

Figure 1.1: Locations of NEXRADs Within CONUS




Loring/Caribou (No WFO)
Duluth
Marquette
Burlington
Portland, ME
DoD Griffiss AFB
Minneapolis/St Paul
Alpena
Albany
Green Bay
Grand Rapids/Muskegon
Boston
La Crosse
Binghamton
Buffalo
Milwaukee
Detroit
Central Pennsylvania
New York City
Quad Cities
Des Moines
Chicago
Cleveland
Pittsburgh
Philadelphia
Indiana-polis
Cincinnati
DoD Dover AFB
Baltimore, MD/Washington, DC
KC Bannister (T)
Central Illinois
Charleston, WV
Norfolk/Richmond
Louisville
St Louis
Kansas City
Jackson
DoD
Paducah
Ft Campbell
Roanoke
Springfield
Raleigh/Durham
Knoxville/Tri-Cities
Nashville
Morehead City
Memphis
Wilmington
Greer
Little Rock
Columbia
DoD Columbus AFB
Atlanta
Birmingham
DoD Robins AFB
Charleston, SC
Shreveport
Jackson
DoD East Alabama
DoD Moody AFB
DoD Ft. Polk
DoD Keesler (T)
DoD Fort Rucker
Jacksonville
Tallahassee
New Orleans/Baton Rouge
Mobile
DoD NW Florida
Lake Charles
Melbourne
Tampa Bay Area
Miami
Key West (No WFO)

NEXRAD History and Status

In 1980, NWS, the Air Force, and FAA agreed to jointly develop and acquire 175 NEXRADs. By 1987, production of a limited number of NEXRAD units had been approved. By 1990, the contractor, Unisys, began experiencing development problems. Unisys was behind schedule, cost estimates were overrun, and specified performance requirements were not being met. Commerce's National Oceanic and Atmospheric Administration (NOAA), of which NWS is a part, raised serious concerns about the contractor's ability to complete the contract. NOAA's concerns focused on cost, schedule, and performance issues, and on Unisys' financial condition. According to a program manager at that time, Unisys underbid the contract. These issues led to NOAA suspending the radar deliveries and considering contract termination.

To address this dilemma, NOAA evaluated the pros and cons of (1) reaching a comprehensive settlement with Unisys to deliver radar systems or (2) terminating the existing contract and contracting with another vendor. After analyzing both choices, NOAA and Unisys signed a comprehensive settlement of contractual issues in August 1991, renegotiated the contract, and the production of radars resumed. The renegotiated contract included a $182 million increase in the contract cost. The associated increase in the unit cost of the NEXRADs forced the Air Force to drop 13 units to remain within its program funding limits.

As of February 1995, 107 radars had been deployed—81 by NWS, 22 by the Air Force, and 4 by FAA. The final NEXRAD deployment is scheduled for June 1996. By September 1995, the three agencies are expected to have collectively spent $1.2 billion.

NEXRADs Contain Three Major Components

Each NEXRAD consists of three major subsystems—the radar data acquisition (RDA) subsystem, the radar product generator (RPG) subsystem, and the principal user processor (PUP) subsystem—and associated communications among these subsystems. Each NEXRAD includes about 400,000 lines of code for operating the radar, processing radar signals, generating and transmitting data, and displaying data products.

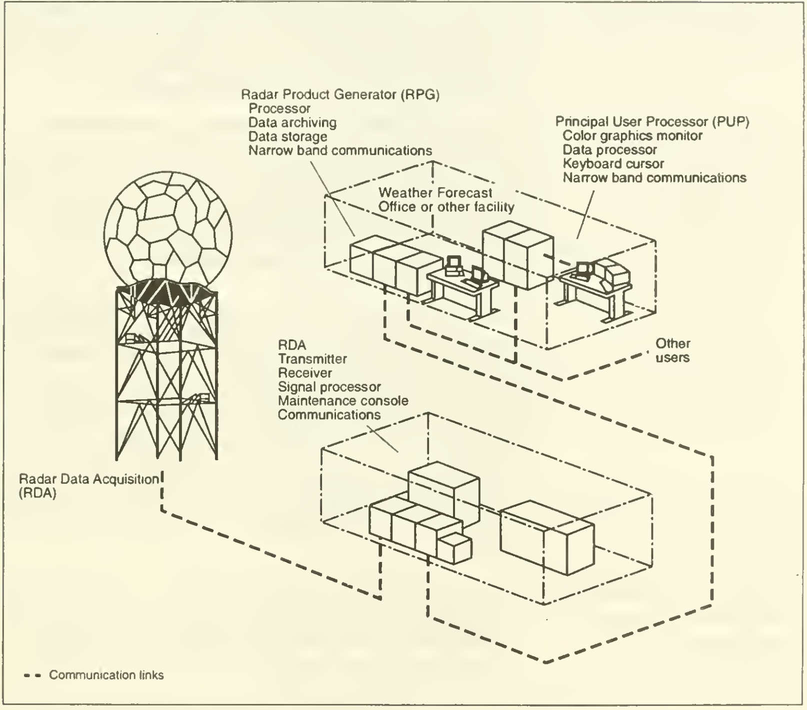
The RDA consists of a 10 centimeter wavelength Doppler weather radar that collects the raw data to, among other things, (1) measure wind velocity in severe weather, (2) provide improved estimates of precipitation amounts, and (3) track storm movement and intensity. The technology needed to perform this function includes an antenna, pedestal, radome (a dome-shaped covering to protect the antenna), transmitter, and receiver.

Included in the RDA unit is hardware and software necessary for a variety of control functions, including signal processing, monitoring, and error detection, as well as archiving the radar data. A computer processes the radar signals to create digital data that can be further processed by the RPG.

The RPG includes all hardware and software necessary for turning the data into displayable data products. Specifically, the RPG provides real-time generation, storage, and distribution of products for users. It includes hardware and software required for system control; status monitoring; and error detection, archiving, and data processing.

The PUP is a workstation that consists of the hardware and software required for the request, display, local storage and annotation, and distribution of products by forecasters. It also includes the hardware and software required for local control, status monitoring, archiving, and communicating with other users. The PUP maintains a dedicated communication link to the RPG located on-site, and it routinely receives NEXRAD products. The PUP also has the capability to access data from RPGS at other NEXRAD sites. In addition, under an NWS administered NEXRAD information dissemination service, NWS has set aside four communications ports to allow access by commercial companies that provide data to other government agencies and the public. Figure 1.2 shows the key NEXRAD subsystems for a typical NWS weather forecast office.

Figure 1.2: Key NEXRAD Subsystems



Program Management and Organization

The NEXRAD Joint Systems Program Office, hereafter referred to as the program office, organizationally resides within NOAA and is responsible for managing the acquisition of the radars. The program office is staffed and funded by the three participating agencies. The radars are to be purchased, operated, and maintained by the respective acquiring agency, but information from each radar is to be shared among all three.

NWS' Office of Systems Operations will assume program management responsibility from the program office once all NEXRADs have been delivered. In addition, the Operational Support Facility provides technical support for operating and maintaining radar equipment. To ensure that the needs of all three agencies are met, both the program office and the Operational Support Facility are jointly staffed and funded by NWS, the Air Force, and FAA. NWS' National Logistics Supply Center in Kansas City, Missouri, will be the centralized NEXRAD depot and repair center for all three agencies' radars.

The Air Force owns all of DOD's NEXRADS, including four radars that are located at Army locations.[6] The Director of Weather, Office of the Deputy Chief of Staff, Plans, and Operations, within the Air Force, is responsible for planning, programming, and budgeting for weather support. The Director of Weather's responsibilities include publishing weather policy[7] and standardized procedures, and assessing the technical performance and effectiveness of Air Force weather support, including those associated with NEXRAD. The Director of Weather disseminates weather policy through the Air Force major commands,[8] which in turn distribute it to the Air Force bases responsible for the individual NEXRAD units. The Air Force is responsible for operating and maintaining DOD NEXRADS. The Air Force's Air Weather Service is the lead organization for oversight of all Air Force NEXRADS.

Objectives, Scope, and Methodology

The objectives of our review were to determine (1) the NEXRAD units that were dropped from the original deployment plan and the reasons they were dropped, (2) the feasibility and estimated cost of extending the NEXRAD contract to purchase additional radars, (3) the Air Force NEXRADS' contribution to the national NEXRAD network and the accessibility of the Air Force NEXRAD data to civilian forecasters, and (4) the availability of the Air Force and NWS radars. Generally, our methodology was guided by those sections of GAO's System Assessment Framework pertaining to operational systems. A detailed description of our methodology follows.

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[6] The Air Force owns the RDAs and RPGs associated with each DOD NEXRAD. The PUPs are owned by the Air Force, Navy, and Army since all services are users of the weather data.

[7] Weather support policy is established in the Office of the Chief of Staff of the Air Force.

[8] These commands include (1) Air Combat Command, (2) Air Education and Training Command, (3) Air Mobility Command, (4) Air Force Material Command, (5) Space Command, and (6) Pacific Air Forces.

To determine which units have been dropped from the original deployment schedule and why they were dropped, we met with NEXRAD program officials to obtain the original and current deployment schedules, discuss which units were dropped or added to the deployment schedule, and identify the reasons why. In addition, we reviewed documentation on the 1991 comprehensive settlement, since this settlement led to the majority of the deployment changes. Finally, we verified our analysis of the units affected and the reasons why with NEXRAD program officials. We did not identify the impact of these changes because the National Research Council (NRC) is currently reviewing the adequacy of proposed NEXRAD CONUS coverage in terms of the "no degradation of service" requirement of the Weather Service Modernization Act.[9]

To determine the feasibility and estimated cost of extending the NEXRAD contract to purchase additional radars, we reviewed the current contract option for additional radars. Since this option is unpriced, we obtained the program office's per unit cost estimate of acquiring radars if this option was exercised and compared this estimate to an oral estimate that the contractor provided to the program office.

To determine the Air Force NEXRADs' contribution to the national network, we reviewed the Federal Meteorological Handbook Number 11, published by the Office of the Federal Coordinator for Meteorology, to identify the types of data Air Force radars provide to NWS. In addition, we interviewed NWS and program officials to determine how NWS accesses and uses the Air Force radar data, and the impact of NWS not having the Air Force radar data. To determine the accessibility of the Air Force NEXRAD data to civilian forecasters, we interviewed program office, NWS, and Air Force officials about potential data restrictions.

To determine the availability of the Air Force radars, we collected and reviewed availability data from the Air Force and NWS operational NEXRAD units and compared these data to the availability requirement specified in the NEXRAD Joint Operational Requirements document. We also interviewed officials from the Air Force's Air Weather Service at Scott Air Force Base near St. Louis, Missouri; the Air Force's Air Combat Command in Hampton, Virginia; NWS' Operational Support Facility and Weather Forecast Office in Norman, Oklahoma; and seven DOD bases that operate and maintain NEXRADS.

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[9] At the request of the House Committee on Science, Space, and Technology (now the House Committee On Science), the Secretary of Commerce commissioned this review by NRC's NWS Modernization Committee to ensure that NWS complies with the Weather Service Modernization Act (Public Law 102-567), which requires, among other things, that the Secretary of Commerce certify that there is no degradation of service resulting from office closures associated with the modernization.

We performed our work primarily at the NEXRAD program office, and NOAA and NWS headquarters in Silver Spring, Maryland. Our work was performed from October 1994 to May 1995, in accordance with generally accepted government auditing standards.

As requested, the Departments of Commerce and Defense provided written comments on a draft of this report. These comments are in appendixes I and II. We obtained oral comments from senior FAA officials, including the NEXRAD program manager. The comments from Commerce, Defense, and FAA are presented and evaluated throughout the report.

NEXRAD Deployments Have Been Reduced and Delayed Because of Requirements Changes, Budget Constraints, and Base Closures

NWS, the Air Force, and FAA plan to meet their needs by deploying 163 NEXRADs worldwide, 12 less than the 175 originally planned. This decrease is due to changes in agency requirements, funding limitations, and military base closures. It includes a net decrease in deployments outside of CONUS of 13 and a net increase in CONUS deployments of 1. NRC is currently studying the adequacy of proposed NEXRAD CONUS coverage. The NRC study director said he expects the study to identify weaknesses in coverage and potential areas where additional radars may be needed.

Most of the 163 radars are to be deployed by the end of fiscal year 1996. However, FAA plans to delay deploying five of its radars until at least fiscal year 1997 because of budget constraints. While these radars are outside CONUS, NWS officials said they are important to NWS' ability to track and forecast severe weather.

Global NEXRAD Deployments Decreased by 12

In November 1991, plans for deploying 13 Air Force and 3 FAA radars were canceled as part of the comprehensive settlement with the NEXRAD contractor. The 16 radars were disposed of by selling 1 radar back to Unisys; using 2 radars for new DOD and FAA requirements; using portions of 3 for NWS training, research, and maintenance activities; using portions of 6 systems to provide redundant hardware at remote locations in order to have backups on hand should equipment fail; and converting the remaining 4 systems to spares.

Since the comprehensive settlement, NWS has added three radars and FAA has added one. In addition, the Air Force has added a requirement for one radar, deleted the requirement for another, and transferred ownership of one of its radars to NWS. The net result is the reduction of 12 NEXRADs. According to program officials, the 163 remaining radars will still satisfy the three agencies' collective requirements and provide radar coverage equal to or better than the existing service. Table 2.1 summarizes the three agencies' respective changes to the deployment plan.

Table 2.1: Changes to Worldwide NEXRAD Plan by Agency

Agency	Original deployment plan	Comprehensive settlement changes	Additional changes	Current deployment plan[a]
NWS	115	0	+4[b]	119
Air Force	44	−13	−1[c]	30
FAA	16	−3	+1[d]	14
Total	**175**	**−16**	**+4**	**163**

[a] These figures include three NWS and three Air Force systems used for training, research, and logistics purposes

[b] NWS added NEXRADs at (1) Greer, South Carolina, (2) Jackson, Kentucky, and (3) the NOAA National Severe Storms Laboratory in Norman, Oklahoma Also, NWS assumed ownership of an Air Force NEXRAD because Loring Air Force Base, Maine, is closing

[c] The Air Force canceled the NEXRAD scheduled for Nellis Air Force Base, Nevada It added a NEXRAD at Fort Polk, Louisiana It also transferred ownership of the NEXRAD at Loring Air Force Base, Maine, to NWS

[d] FAA added a NEXRAD at South Shore, Hawaii.

CONUS NEXRAD Deployments Increased by One

NEXRAD deployments within CONUS originally totaled 143. These deployments now total 144. The net increase of one radar is the result of an assortment of Air Force and NWS deployment changes over the last 4 years that reduced Air Force NEXRADS by three and increased NWS radars by four. Specifically, the Air Force eliminated the requirement for two radars as part of the November 1991 settlement with the contractor. Later, NWS added four radars, and the Air Force dropped an additional radar. FAA never planned to deploy any of its radars within CONUS. Table 2.2 summarizes the agencies' respective changes to the original CONUS deployment plan.

Table 2.2: Changes to NEXRAD Plan Within CONUS by Agency

Agency	Original deployment plan	Comprehensive settlement changes	Additional changes	Current deployment plan[a]
NWS	115	0	+4[b]	119
Air Force	28	−2[c]	−1[d]	25
FAA	0	0	0	0
Total	**143**	**−2**	**+3**	**144**

[a] These figures include three NWS and three Air Force systems used for training, research, and logistics purposes. NWS and the Air Force will deploy 116 and 22 CONUS-based operational systems respectively.

[b] NWS added NEXRADs at (1) Greer, South Carolina, (2) Jackson, Kentucky, and (3) the NOAA National Severe Storms Laboratory in Norman, Oklahoma. Also, NWS assumed ownership of an Air Force NEXRAD because Loring Air Force Base, Maine, is closing.

[c] The Air Force canceled NEXRADs scheduled for Grissom Air Force Base, Indiana, and England Air Force Base, Louisiana, due to projected base closures.

[d] The Air Force canceled the NEXRAD scheduled for Nellis Air Force Base, Nevada. It also added a NEXRAD at Fort Polk, Louisiana, and transferred ownership of the NEXRAD at Loring Air Force Base, Maine, to NWS.

NEXRAD Deployment Changes Due to Budget Constraints, Requirement Changes, and Base Closures

In total, 23 changes have been made to the original NEXRAD deployment schedule. Of these 23, 9 changes were made because budget constraints prevented the purchase of planned radars;[1] 9 were because the requirement for a radar at a given site was deleted or a new requirement was added;[2] 4 were because the military base that was to receive the radar was identified for closure; and 1 was because the frequency over which the radar's signal is transmitted was unavailable at the planned overseas deployment location.

Of the 23 changes, 3 related to NWS radars, 16 related to Air Force radars (11 overseas), and 4 related to FAA radars. Table 2.3 identifies the changes by agency, sites affected, type, and reason for each of the 23 changes.

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[1] These budget constraints arose because radar unit cost increases associated with the comprehensive settlement prevented the Air Force from buying as many radars as originally planned while still staying within its program budget.

[2] Program office officials stated that FAA and the Air Force deleted requirements for three and one radars, respectively, because justification for the original requirements was later invalidated.

Table 2.3: Locations of and Reasons for Changes in NEXRAD Deployment Schedule

Agency	Site	Change	Reason
Air Force	Central Germany	Deletion	Budget constraint
Air Force	Eastern Germany	Deletion	Budget constraint
Air Force	Western Germany	Deletion	Budget constraint
Air Force	Aviano Air Base, Italy	Deletion	Budget constraint
Air Force	Crotone Air Base, Italy	Deletion	Budget constraint
Air Force	Camp New Amsterdam, Netherlands	Deletion	Budget constraint
Air Force	Zaragoza Air Base, Spain	Deletion	Budget constraint
Air Force	East United Kingdom	Deletion	Budget constraint
Air Force	West United Kingdom	Deletion	Budget constraint
Air Force	Clark Air Base, Philippines	Deletion	Base closure
Air Force	Yokota Air Base, Japan	Deletion	Frequency unavailable
Air Force	England Air Force Base, Louisiana	Deletion	Base closure
Air Force	Grissom Air Force Base, Indiana	Deletion	Base closure
Air Force	Nellis Air Force Base, Nevada	Deletion	Requirement deleted
Air Force	Fort Polk, Louisiana	Addition	New requirement
Air Force	Loring Air Force Base, Maine	Transfer	Base closure
FAA	McGrath, Alaska	Deletion	Requirement deleted
FAA	Bering Sea, Alaska	Deletion	Requirement deleted
FAA	Site to be determined	Deletion	Requirement deleted
FAA	South Shore, Hawaii	Addition	New requirement
NWS	Greer, South Carolina	Addition	New requirement
NWS	Jackson, Kentucky	Addition	New requirement
NWS	National Severe Storms Laboratory, Norman, Oklahoma	Addition	New requirement

NRC Is Studying the Adequacy of Planned NEXRAD Coverage

According to NWS, the current tri-agency plan for deploying 138 operational NEXRADS within CONUS will provide radar coverage equal to or better than existing coverage. However, at the request of the House Committee on Science, Space, and Technology (now the House Committee on Science), the Secretary of Commerce commissioned an independent review of NEXRAD CONUS coverage. The Committee did this to ensure that NWS complies with the Weather Service Modernization Act, which requires, among other things, that the Secretary of Commerce certify that the modernization result in no degradation in service.

The Secretary of Commerce asked the NRC Committee on National Weather Service Modernization to perform this study. The NRC study director said he expects the study, which NRC plans to issue in June 1995, to identify potential areas where coverage is degraded and where additional radars may be needed. Because of NRC's study, we did not address the impact of the reduced number of radars on the three agencies' radar coverage objectives.

Five FAA NEXRADs to Be Placed in Temporary Storage

FAA currently plans to place 5 of its 14 NEXRADs in storage for probably more than a year because deploying the radars is not a funding priority.[3] The five FAA NEXRADs are paid for and scheduled for delivery around June 1996. However, FAA's fiscal year 1996 budget request does not include the $18 million needed to deploy them. According to the FAA program manager for NEXRAD, the earliest that FAA may request funds is fiscal year 1997; however, the program manager does not expect funding approval at that time. The program manager attributed the funding shortfall to deployment costs that were higher than expected.

NWS did not plan to place NEXRADs in these locations because NWS does not have a mission requirement for radar coverage outside CONUS. However, according to NWS officials, data from planned NEXRADs in Alaska, Hawaii, and the Caribbean will be used by NWS to enhance its ability to provide timely and accurate forecasts and warnings. For instance, according to the NOAA Assistant Administrator for Weather Services, two of these radars in the Caribbean would allow NWS to better track and monitor hurricanes approaching the United States. Despite NWS' desire to have radars in these areas, the NOAA Assistant Administrator for Weather Services stated that should FAA decide not to deploy these radars, he is not sure whether NWS would choose to do so.

Conclusions

NRC is expected to identify weaknesses in NEXRAD's national coverage that may suggest that NWS buy additional radars. However, five FAA radars planned for Alaska, Hawaii, and the Caribbean are paid for and will be warehoused indefinitely. While NWS does not have a mission requirement for radars in these locations, NWS officials stated that radars in these geographic areas would enhance its ability to provide forecasts and warnings. Consequently, NWS is uncertain whether it would choose to deploy radars in these areas should FAA decide not to.

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[3] The five sites are (1) Georgetown, Bahamas, (2) Grand Turk, British West Indies, (3) South Shore, Hawaii, (4) Kohala, Hawaii, and (5) Nome, Alaska.

Recommendation

We recommend that the Secretary of Commerce direct the NOAA Assistant Administrator for Weather Services to not purchase additional radars to address any weaknesses in radar coverage that may result from the NRC study until assessing FAA's plans for deploying the five radars scheduled for storage and NWS' mission requirements for NEXRADs in these areas.

Agency Comments and Our Evaluation

In a draft of this report, we proposed that the NOAA Assistant Administrator for Weather Services assess the operational impact of FAA's delays in deploying the five radars and, on the basis of this assessment, take the necessary steps to ensure that NWS radar coverage needs are met. Both the Department of Commerce and the FAA NEXRAD program manager stated that NWS does not have a mission requirement for radars outside CONUS. We have incorporated these comments in the section describing FAA's plans for storing five radars and subsequently revised our recommendation in this chapter.

The Department of Commerce also stated that we did not accurately characterize the NRC study. Commerce stated the NRC study is of proposed NEXRAD radar coverage and consolidation of field offices to ensure the "no degradation of service" requirement of the Weather Service Modernization Act. We have clarified references to the NRC study in our report to state that the study is of proposed NEXRAD coverage as compared to premodernization radar coverage.

Commerce also noted that NOAA believes that the currently planned NEXRAD network will provide radar coverage equal to or better than the existing service, and that NOAA is aware of gaps in modernized radar coverage. Our report has been modified to reflect this.

Commerce also stated that the number of systems to be purchased and deployed still stands at 175, rather than the 163 we reported. It explained the disposition of the radars resulting from the comprehensive settlement. We agree with this explanation and have added a clarifying statement in this chapter. However, the number of systems to be deployed is 163. This number, which is based on our review of the NEXRAD deployment schedule, is consistent with program office documentation and with the total presented by the Under Secretary for Oceans and Atmosphere, before the Senate Subcommittee on Science, Technology, and Space, Committee on Commerce, Science, and Transportation in his January 31, 1995, testimony.

Unit Cost of Any Additional NEXRADs May Be Substantially Higher

The program office has the option to buy up to 20 additional NEXRADS through August 1996 or the date that the last radar is delivered, whichever occurs first. However, this option is not priced, meaning that it is subject to negotiation. Program officials estimate that if the option was exercised, the unit cost could be as much as three times the cost of those currently under contract.[1] Because the program office has no current plans for buying additional radars, it has not reassessed the cost-effectiveness of the more expensive radars. However, as mentioned in chapter 2, NRC's study is expected to report on gaps in NEXRAD national coverage that could suggest the purchase of more radars via this contract option.

Additional NEXRADs May Cost as Much as Three Times Current Costs

The program office agreed to an unpriced option because no firm requirements for additional radars existed at the time the current contract option was negotiated. Further, the contractor opposed pricing the option because of the uncertainty of future costs, such as restarting production lines. According to program officials, the contractor would not agree to a priced option without knowing how many or when additional radars would be ordered.

While the price of the additional NEXRADS, should they be required, will ultimately be subject to negotiation, the program office estimates that the hardware and software costs for each radar could be as much as three times that of the mean cost of radars currently under contract. The program office based this estimate on a recently expired, priced contract option that had a not-to-exceed price. It then factored in additional costs due to breaks in production. These disruptions increase costs because the longer the government waits to exercise the option, the greater the chances that the contractor and its subcontractors will have shut down part or all of their production lines and started work for other clients. According to program officials, this has already occurred as the subcontractor responsible for the transmitter has closed its production line.

The program office estimate is consistent with a nonbinding, verbal estimate that the contractor provided to the program office. This contractor estimate, however, assumed that the option would be exercised in the first quarter of fiscal year 1995. Exercising the option later, according to program officials, would result in a higher unit cost. In addition, the program office based its estimate on the purchase of 12 radars. Purchasing fewer radars would also increase the unit cost because manufacturing start-up costs for a smaller order would be allocated over fewer units.

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[1] The actual unit cost estimate is not disclosed in this report because the information may be acquisition sensitive.

Office of Management and Budget Circular A-11[2] requires that agencies use benefit-cost analyses to evaluate contemplated investments in information technology. The purpose of these analyses is to maximize an agency's return on its information technology dollar. In addition, these analyses are not to be one-time exercises performed at the beginning of a project. Instead, it is fiscally prudent to redo these analyses whenever expected benefits or estimated costs change significantly. Without reassessing a system's payback in the event of sizeable cost growth, poor investment decisions can result.

As mentioned in chapter 2, weaknesses in NEXRAD's national coverage that are identified by NRC may suggest that NWS buy additional radars. Should this occur, the existing contract option would be an available vehicle for doing so, subject to applicable procurement regulations. The program office has not assessed the cost-effectiveness of purchasing the additional units because currently no requirements exist for additional radars. If this changes, program officials agreed that it would be wise in deciding whether or not to exercise the contract option, to reassess the benefits to be derived from the additional radars against their higher cost.

Conclusion

Additional NEXRADS could cost as much as three times more than units currently under contract. At this price, the radars' benefits may not exceed their cost, and thus buying more may not be worth the investment. While NWS officials acknowledged the value in reassessing the benefits versus the costs of the more expensive radars before exercising the NEXRAD contract option, they did not commit to doing so since requirements for additional radars currently do not exist.

Recommendation

We recommend that the Secretary of Commerce direct the NOAA Assistant Administrator for Weather Services to ensure that any radars bought in response to NRC's national radar coverage findings are cost-beneficial, given that their unit cost could be substantially higher than those already purchased.

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[2] Preparation and Submission of Budget Estimates, July 1994

Agency Comments and Our Evaluation

In its comments, the Department of Commerce partially concurred with our recommendation to ensure that any radars bought in response to NRC's coverage findings are cost-beneficial. Commerce agreed that the requirements to procure additional radars need to be justified; however, it requested that the recommendation be modified to reflect only NWS' core mission and the Weather Service Modernization Act requirements. The NRC study director told us that the act was used as criteria in its evaluation. We, therefore, did not modify our recommendation.

In addition, Commerce stated that while the existing contract option is an available vehicle for buying additional radars should the need arise, it is by no means obvious that this vehicle would be exercised. Commerce added that under federal acquisition regulations, the government would have to determine the best approach for acquiring additional systems. We have modified the report to address these concerns.

Air Force NEXRADs Are Integral to NWS Mission Performance and Accessible to NWS Forecasters

The Air Force's NEXRADs play an integral role in NWS' ability to issue accurate and timely weather forecasts and warnings. These radars, which provide essential primary, backup, and supplemental coverage, are vital in supporting the NWS CONUS-based network. Seven of the 22 CONUS-based operational Air Force NEXRADs provide primary NWS radar coverage. The Air Force NEXRADs also provide backup coverage in the event an NWS NEXRAD is not operating, according to NWS officials. Further, the Air Force NEXRADs augment other NEXRADs by covering severe weather events from different angles, thus strengthening NWS' watch and warning capabilities by providing additional insights into the event's behavior. To illustrate, the Altus Air Force Base NEXRAD in Frederick, Oklahoma, is critical to coverage in parts of Oklahoma and Texas because adjacent NWS radars reach only marginally into these areas.

NWS has unrestricted access to all Air Force, CONUS-based NEXRAD products. According to a tri-agency agreement, all NEXRADs "shall be operated to satisfy the integrated needs of all three agencies." Further, each agency is to "support, to the maximum extent possible, the data, products, and operational requirements of the others, consistent with the capabilities and mission priorities of that agency." All CONUS Air Force sites are specifically required to "provide assistance to NWS offices by providing access to weather radar data for gaps in the National Weather Radar Network."

NWS' access to the Air Force's CONUS-based NEXRADs is accomplished via dedicated and dial-up communication lines. Currently, 13 weather offices have dedicated lines to Air Force NEXRADs. The 13 offices are generally the closest ones geographically to the Air Force radars. These dedicated lines operate at 9.6 kilobits per second. Each Air Force NEXRAD also provides three to four dial-up communication ports for use by other NWS field offices. These lines are also 9.6 kilobits per second and are reserved for NWS use.

Agency Comments and Our Evaluation

In its comments, the Department of Commerce agreed that the Air Force NEXRADs are essential to NWS' ability to issue quality forecasts and warnings, and that our report adequately describes most of the meteorological aspects of this need. However, Commerce stated that the Air Force's radars need to be reconfigured to accept input from real-time rain gauges to meet the needs of the River Forecast Centers. Although we understand NWS' desire for all Air Force CONUS-based NEXRADs to accept input from rain gauges, the tri-agency agreement does not establish a requirement for Air Force NEXRADS to perform this function. The agreement states that a CONUS-based Air Force NEXRAD "shall not execute the rain gauge data acquisition function." We confirmed with NWS officials that the rain gauge data acquisition function is still not an Air Force NEXRAD requirement.

In its comments, the Department of Defense disagreed with our conclusion on the role Air Force radars play in the National Weather Radar Network. Specifically, Defense disagreed with our use of the term backup when associated with the Air Force's radars, because it implies that the Air Force's radars are integral parts of the national network. Defense stated that the tri-agency documentation defines NWS' radars as network sites and the Air Force's as supplemental sites, and that therefore we should not refer to the Air Force CONUS-based NEXRADS as backup systems, but rather as supplemental sites.

We have decided not to use the term supplemental when referring to these Air Force radars because they provide primary, backup, and supplemental coverage. For example, the tri-agency documentation specifically states that CONUS-based supplemental Air Force sites are to "provide assistance to NWS offices by providing access to weather radar data for gaps in the National Weather Radar Network." Today, 7 of the 22 CONUS-based operational Air Force NEXRADS provide the sole radar coverage for certain geographic areas. NWS officials also told us that NWS uses data from Air Force NEXRADS to provide backup coverage and to supplement data from their NEXRADS, as well as to provide primary coverage. On the basis of this combination of primary, backup, and supplemental coverage, the Air Force CONUS-based NEXRADS contribute considerably to the national NEXRAD network and are indeed integral parts of the national network.

Chapter 5

Air Force and NWS NEXRADs May Not Be Available When Needed

To effectively support NWS' requirements for CONUS radar coverage, it is important that the Air Force's NEXRADs meet all specified requirements. However, Air Force data show that some of its radars are performing below the tri-agency system availability requirement. Moreover, because Air Force availability data are unreliable and appear to be overstated, it is uncertain whether any of its radars are meeting availability requirements. Opportunities exist to improve Air Force NEXRAD availability performance by increasing radar operator awareness of the availability requirement and streamlining the spare parts logistic process. In addition, because NWS currently does not calculate and monitor availability by site, there is no way to determine whether each NWS NEXRAD is meeting the availability requirement.

Air Force NEXRADs Are Not Meeting System Availability Requirements

NWS, the Air Force, and FAA have specified that each NEXRAD unit must be operationally available 96 percent of the time.[1] According to NWS officials, the 96 percent requirement is based on an analysis that considered factors such as equipment reliability, staff costs, and spare parts costs. These officials stated that the additional costs (for example, redundant systems, spare parts, and additional maintenance technicians) associated with achieving availability above 96 percent were not worth the added benefits.

Many of the Air Force's NEXRADs are not meeting the 96-percent availability requirement. Since January 1994, the reported percent of operational Air Force NEXRADs meeting this requirement each month has ranged from 38 to 90 percent (see figure 5.1).

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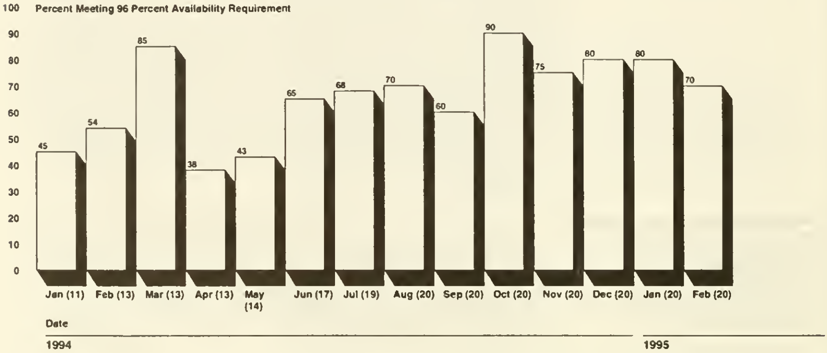
[1] The NEXRAD Joint Operational Requirements define availability as the time that the system is operating satisfactorily, expressed as a percentage of total time (the time the system is operating satisfactorily plus the time the system is down). Downtime includes corrective and preventive maintenance time and delays encountered due to the delivery of needed spare parts. Most definitions of availability exclude scheduled downtime, such as preventive maintenance.

Figure 5.1: Number of Air Force NEXRADs Meeting 96-Percent Availability Requirement



Note Numbers in parentheses indicate the number of Air Force NEXRADs in operation.

However, the data upon which these availability statistics are based are unreliable and appear to be overstated. For example, the Air Force data provided by the Air Weather Service show that nine NEXRADs have been operationally available 100 percent of the time for 4 or more consecutive months. This is highly unlikely considering that, according to NWS' Chief Logistician, the radars are likely to fail an average of 52 times a year, or about 4 times per month. We contacted six of the nine sites reporting 4 or more consecutive months of 100 percent availability and found that three of the sites had significant outages during this time. For example, data for Eglin Air Force Base show 100 percent availability for September through December 1994, but Eglin radar officials stated that their radar was available for these 4 months only 87, 78, 79, and 87 percent of the time, respectively. Similarly, data for Dyess Air Force Base show 100 percent availability for February 1995, but Dyess officials stated that their radar was available only 81 percent of the time in February 1995. Also, data for

Robins Air Force Base show 100 percent availability for September 1994, but Robins officials stated that their radar was unavailable for 12 days in September 1994 while they were waiting for a replacement part.

According to an internal Air Force report dated October 1994,[2] the availability data inconsistencies are not unique to NEXRAD, but rather extend to all Air Force command, control, communications, and computer (C4) systems. The report stated that not all system performance data are being collected and reported on C4 systems. This occurs, according to the report, because C4 personnel do not adequately understand and are not sufficiently trained in the maintenance data collection process and because the systems collecting and reporting the performance data have software problems that have gone unchecked. The report recommends that the Air Force establish a team to address these problems.

Air Force NEXRAD Operators and Maintainers Are Unaware of the Tri-Agency Availability Requirement

Air Force operators and maintainers are unaware of the 96-percent availability requirement and, therefore, have no way of knowing if actual radar performance is satisfactory. We contacted operations and maintenance technicians at 7 of the 20 Air Force sites that have an operational NEXRAD, and found that none of the technicians were aware of the tri-agency availability requirement. We then examined the availability data for these seven sites, and found that six of the seven were not meeting the requirement 13 to 44 percent of the time. Although the seventh site's data show it to be meeting the requirement, these data show 8 consecutive months of 100-percent availability, and thus as discussed earlier, are clearly unreliable and appear to be overstated.

Air Force Process for Obtaining Spares Is Inefficient, but Improvements Are Underway

The supply and logistics process that Air Force sites follow to obtain NEXRAD spare parts is inefficient and more time-consuming than NWS' process. Specifically, when an NWS radar needs a replacement part that is not on hand, technicians request the part directly from NWS' National Logistics Supply Center in Kansas City, Missouri. The Center, in turn, sends the part directly to the requesting site. In contrast, Air Force technicians must request the part from the Air Force's Sacramento Air Logistics Center, which records the transaction and electronically passes the request on to NWS' Office of Systems Operations for processing.[3] At this point the order is then processed in the same manner as an NWS order.

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[2] Command, Control, Communications, and Computer Data Reporting Problem Process Action Team Summary Report, October 1994

This problem is even more severe for the four CONUS Air Force NEXRADS located near Army installations, where parts that are ordered are first sent to the nearest Air Force base, which records the transaction and then ships the parts to the Army base. The distance between the Air Force and Army locations varies from 90 to 330 miles, causing an additional delay of at least 4 to 12 hours. Air Force officials told us that they strive to keep their NEXRADS operational 100 percent of the time; however, the current system component failure rates and the logistics process Air Force NEXRAD sites must follow to obtain spare parts from NWS' National Logistics Supply Center make it difficult to achieve the 96-percent availability requirement. Figure 5.2 shows the additional steps required for the Air Force and Army NEXRAD sites to obtain needed spare parts.

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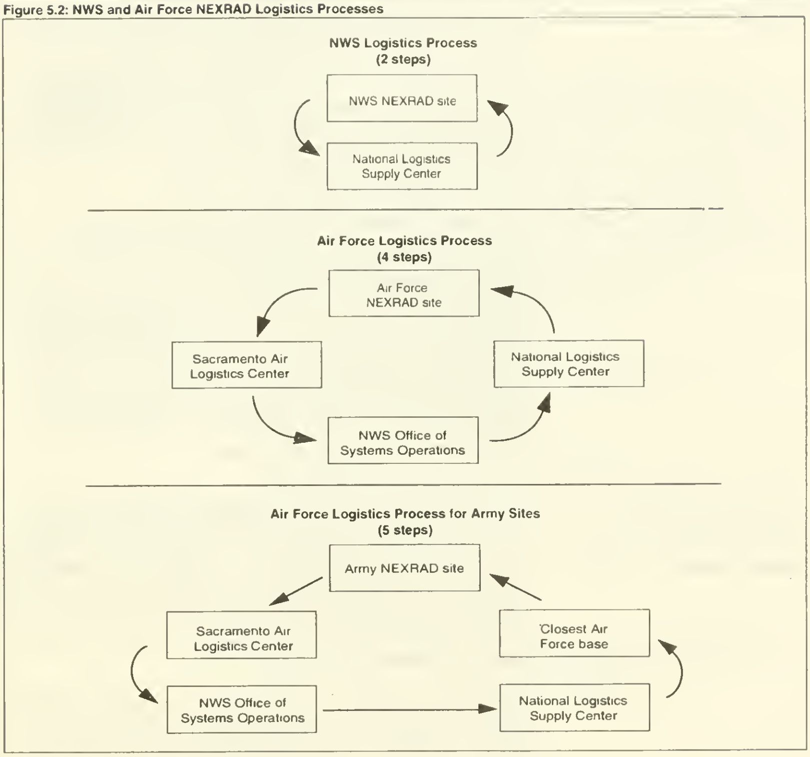
[3] The requisitioning process through the Sacramento Air Logistics Center is required for financial tracking purposes.

Figure 5.2: NWS and Air Force NEXRAD Logistics Processes


NWS Logistics Process
(2 steps)
NWS NEXRAD site
National Logistics Supply Center
Air Force Logistics Process
(4 steps)
Air Force NEXRAD site
Sacramento Air Logistics Center
National Logistics Supply Center
NWS Office of Systems Operations
Air Force Logistics Process for Army Sites
(5 steps)
Army NEXRAD site
Sacramento Air Logistics Center
Closest Air Force base
NWS Office of Systems Operations
National Logistics Supply Center

NWS' Chief Logistician also identified several other logistics inefficiencies that contributed to the limited availability of the Air Force's NEXRADS. For example, until October 1994, the Air Logistics Center did not operate on evenings, nights, and weekends. Also, NWS did not have accurate and complete addresses for all Air Force NEXRAD sites, and thus parts would sometimes arrive at the base, but would not be delivered to the proper maintenance location. NWS' Chief Logistician stated that these problems have added days to the parts delivery process. Also contributing to the Air Force radars' availability shortfalls, according to the Chief Logistician, has been a limited supply of parts at Air Force NEXRAD sites.

To address these logistics concerns, NWS and Air Force officials established a logistics working group in September 1993. Members of this group stated that a number of the procedural problems have been eliminated. For example, they said that the group has automated the parts request process through the Air Logistics Center to the Office of Systems Operations so that parts orders can be placed 24 hours a day for emergency requisitions. They also said that the group provided NWS with complete addresses for all base supply organizations servicing Air Force NEXRAD sites. Also, they said that steps are underway to improve the stocking of on-site spares. In addition to these initiatives, they cited steps underway to provide better service to remote Army NEXRAD sites. For example, the Air Force is examining whether a common carrier can deliver parts to Army NEXRAD sites more quickly.

NWS Does Not Monitor Availability Data by Site

NWS does not calculate operational availability for each NEXRAD site, and thus does not know whether each radar site is meeting the availability requirement. Although NWS records radar downtime by site, it only uses this information to calculate the average availability of all sites, and it only monitors radar availability performance on this basis. It does not use this information to calculate and monitor site-specific availability. NWS officials stated that monitoring overall availability, rather than individual availability, is useful in determining such things as spare parts usage and maintenance staffing trends.

While we agree that such data on availability are useful, aggregate data do not allow NWS to determine whether each radar meets the required 96-percent availability requirement. The Office of Systems Operations Director agreed that it was important to track availability by site, and said that NWS would monitor availability on a site-by-site basis in the future.

However, this change has yet to occur, and a time frame for doing so has not been established.

Conclusions

Air Force NEXRADS fall short of system availability requirements, thus increasing the risk that NWS will not have the data it needs to accurately and quickly predict severe weather. This risk is more severe than the data show because the Air Force availability data are unreliable and because NWS is not even analyzing and monitoring each radar's availability. While we believe that the steps described by Air Force and NWS officials to improve NEXRAD availability are reasonable, we did not verify that they have occurred. Further, the actual impact that each will have on system availability still remains to be seen, and the availability of NWS' sites also remains unknown. Until NWS and the Air Force meet stated radar availability requirements, lives and property are at greater risk.

Recommendations

We recommend that the Secretary of the Air Force direct the Air Force Director of Weather to improve the reliability of the Air Force NEXRAD availability data and to correct any shortfalls that these data show.

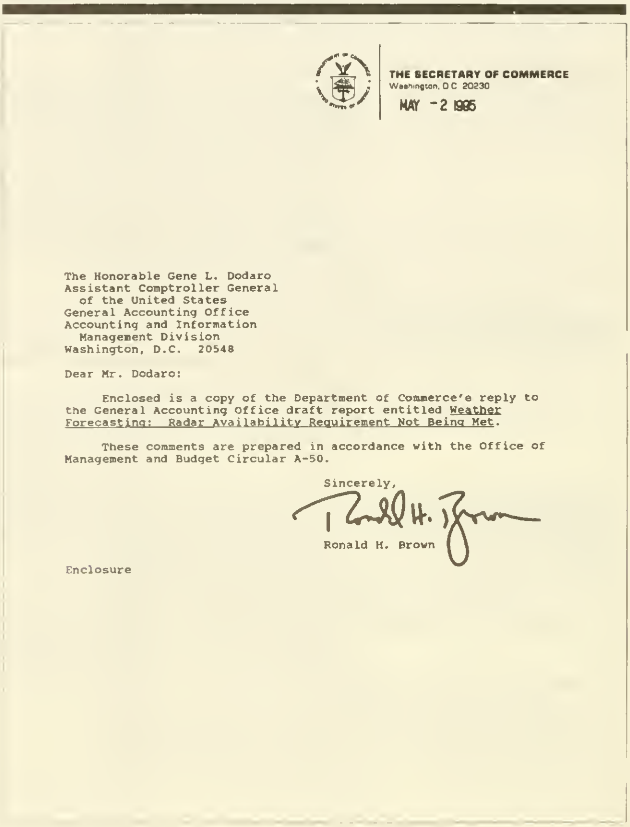
We recommend that the Secretary of Commerce direct the NOAA Assistant Administrator for Weather Services to begin analyzing and monitoring system availability data on a site-specific basis for its operational NEXRADS and correct any shortfalls in system availability that this analysis shows.

Agency Comments and Our Evaluation

In its comments, the Department of Defense concurred with our recommendation concerning the Air Force and stated that it will develop management actions by mid-fiscal year 1996 to improve NEXRAD availability and the reliability of DOD data.

The Department of Commerce also concurred with our recommendation concerning the analysis and monitoring of system availability data on a site-specific basis and stated that NWS is taking steps to allowing it to analyze and monitor system availability on a site-specific basis.

Comments From the Department of Commerce



THE SECRETARY OF COMMERCE
Washington, D.C. 20230

MAY - 2 1995

The Honorable Gene L. Dodaro
Assistant Comptroller General
of the United States
General Accounting Office
Accounting and Information
Management Division
Washington, D.C. 20548

Dear Mr. Dodaro:

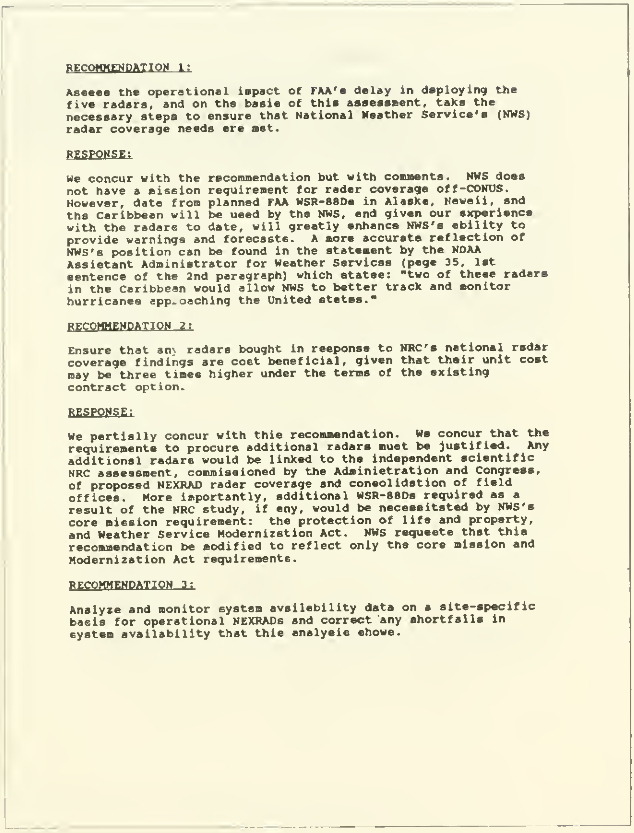
Enclosed is a copy of the Department of Commerce's reply to the General Accounting Office draft report entitled Weather Forecasting: Radar Availability Requirement Not Being Met.

These comments are prepared in accordance with the Office of Management and Budget Circular A-50.

Sincerely,

Ronald H. Brown

Enclosure



RECOMMENDATION 1:

Assess the operational impact of FAA's delay in deploying the five radars, and on the basis of this assessment, take the necessary steps to ensure that National Weather Service's (NWS) radar coverage needs are met.

RESPONSE:

We concur with the recommendation but with comments. NWS does not have a mission requirement for radar coverage off-CONUS. However, data from planned FAA WSR-88Ds in Alaska, Hawaii, and the Caribbean will be used by the NWS, and given our experience with the radars to date, will greatly enhance NWS's ability to provide warnings and forecasts. A more accurate reflection of NWS's position can be found in the statement by the NOAA Assistant Administrator for Weather Services (page 35, 1st sentence of the 2nd paragraph) which states: "two of these radars in the Caribbean would allow NWS to better track and monitor hurricanes approaching the United States."

RECOMMENDATION 2:

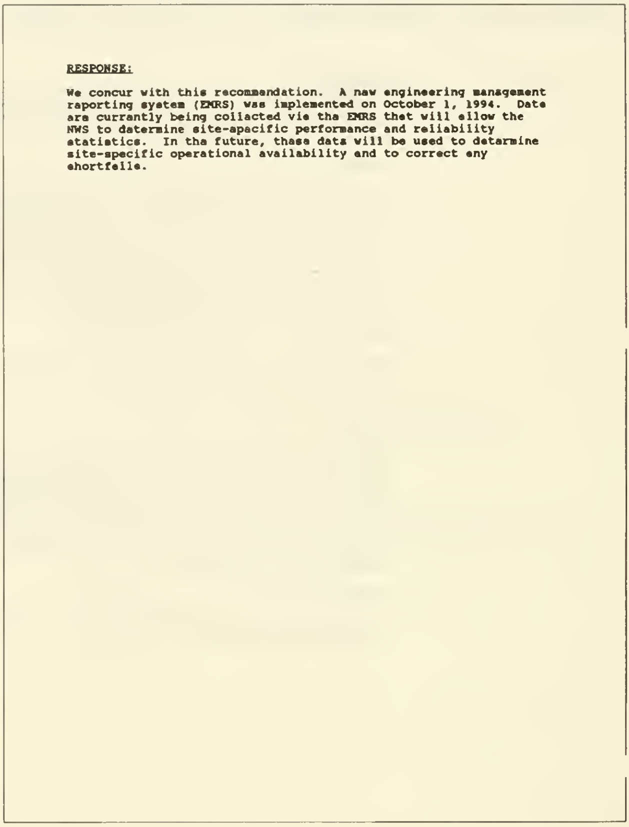
Ensure that any radars bought in response to NRC's national radar coverage findings are cost beneficial, given that their unit cost may be three times higher under the terms of the existing contract option.

RESPONSE:

We partially concur with this recommendation. We concur that the requirements to procure additional radars must be justified. Any additional radars would be linked to the independent scientific NRC assessment, commissioned by the Administration and Congress, of proposed NEXRAD radar coverage and consolidation of field offices. More importantly, additional WSR-88Ds required as a result of the NRC study, if any, would be necessitated by NWS's core mission requirement: the protection of life and property, and Weather Service Modernization Act. NWS requests that this recommendation be modified to reflect only the core mission and Modernization Act requirements.

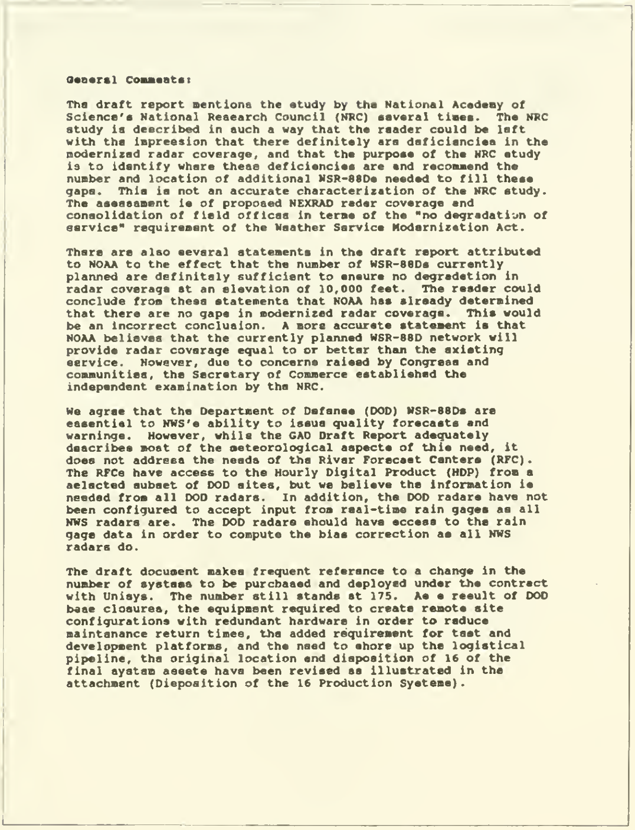
RECOMMENDATION 3:

Analyze and monitor system availability data on a site-specific basis for operational NEXRADs and correct any shortfalls in system availability that this analysis shows.



RESPONSE:

We concur with this recommendation. A new engineering management reporting system (EMRS) was implemented on October 1, 1994. Data are currently being collected via the EMRS that will allow the NWS to determine site-specific performance and reliability statistics. In the future, these data will be used to determine site-specific operational availability and to correct any shortfalls.



General Comments:

The draft report mentions the study by the National Academy of Science's National Research Council (NRC) several times. The NRC study is described in such a way that the reader could be left with the impression that there definitely are deficiencies in the modernized radar coverage, and that the purpose of the NRC study is to identify where these deficiencies are and recommend the number and location of additional WSR-88Ds needed to fill these gaps. This is not an accurate characterization of the NRC study. The assessment is of proposed NEXRAD radar coverage and consolidation of field offices in terms of the "no degradation of service" requirement of the Weather Service Modernization Act.

There are also several statements in the draft report attributed to NOAA to the effect that the number of WSR-88Ds currently planned are definitely sufficient to ensure no degradation in radar coverage at an elevation of 10,000 feet. The reader could conclude from these statements that NOAA has already determined that there are no gaps in modernized radar coverage. This would be an incorrect conclusion. A more accurate statement is that NOAA believes that the currently planned WSR-88D network will provide radar coverage equal to or better than the existing service. However, due to concerns raised by Congress and communities, the Secretary of Commerce established the independent examination by the NRC.

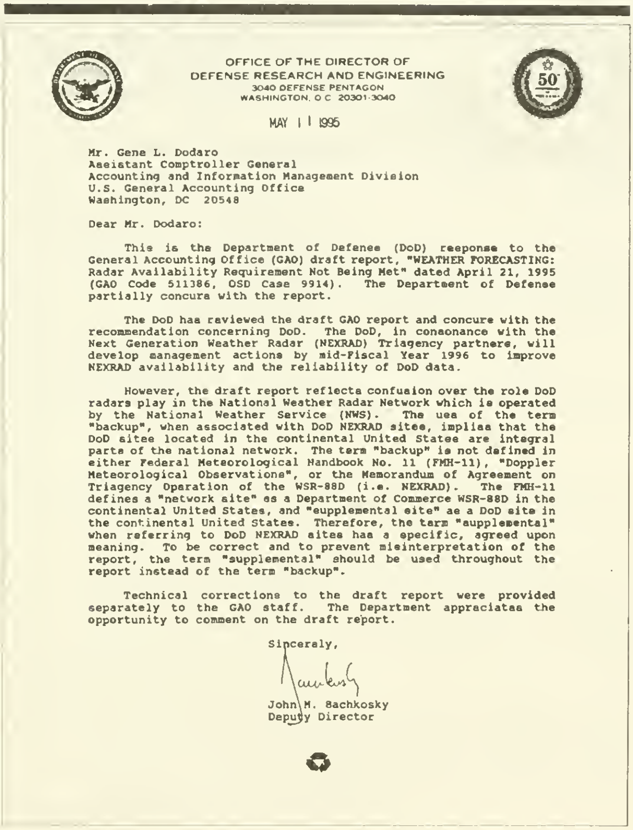
We agree that the Department of Defense (DOD) WSR-88Ds are essential to NWS's ability to issue quality forecasts and warnings. However, while the GAO Draft Report adequately describes most of the meteorological aspects of this need, it does not address the needs of the River Forecast Centers (RFC). The RFCs have access to the Hourly Digital Product (HDP) from a selected subset of DOD sites, but we believe the information is needed from all DOD radars. In addition, the DOD radars have not been configured to accept input from real-time rain gages as all NWS radars are. The DOD radars should have access to the rain gage data in order to compute the bias correction as all NWS radars do.

The draft document makes frequent reference to a change in the number of systems to be purchased and deployed under the contract with Unisys. The number still stands at 175. As a result of DOD base closures, the equipment required to create remote site configurations with redundant hardware in order to reduce maintenance return times, the added requirement for test and development platforms, and the need to shore up the logistical pipeline, the original location and disposition of 16 of the final system assets have been revised as illustrated in the attachment (Disposition of the 16 Production Systems).

Note: The Department of Commerce also included in its comments a statement that the existing contract option is an available vehicle for buying additional radars, and, thus, any references to the estimated costs of exercising this option are potentially acquisition sensitive. We have deleted this statement from the Department's comments because it identified the estimated unit cost.

Appendix II

Comments From the Department of Defense



OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING
3040 DEFENSE PENTAGON
WASHINGTON, D C 20301-3040

MAY 11 1995

Mr. Gene L. Dodaro
Assistant Comptroller General
Accounting and Information Management Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Dodaro:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "WEATHER FORECASTING: Radar Availability Requirement Not Being Met" dated April 21, 1995 (GAO Code 511386, OSD Case 9914). The Department of Defense partially concurs with the report.

The DoD has reviewed the draft GAO report and concurs with the recommendation concerning DoD. The DoD, in consonance with the Next Generation Weather Radar (NEXRAD) Triagency partners, will develop management actions by mid-Fiscal Year 1996 to improve NEXRAD availability and the reliability of DoD data.

However, the draft report reflects confusion over the role DoD radars play in the National Weather Radar Network which is operated by the National Weather Service (NWS). The use of the term "backup", when associated with DoD NEXRAD sites, implies that the DoD sites located in the continental United States are integral parts of the national network. The term "backup" is not defined in either Federal Meteorological Handbook No. 11 (FMH-11), "Doppler Meteorological Observations", or the Memorandum of Agreement on Triagency Operation of the WSR-88D (i.e. NEXRAD). The FMH-11 defines a "network site" as a Department of Commerce WSR-88D in the continental United States, and "supplemental site" as a DoD site in the continental United States. Therefore, the term "supplemental" when referring to DoD NEXRAD sites has a specific, agreed upon meaning. To be correct and to prevent misinterpretation of the report, the term "supplemental" should be used throughout the report instead of the term "backup".

Technical corrections to the draft report were provided separately to the GAO staff. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

John M. Bachkosky
Deputy Director

Appendix III

Major Contributors to This Report

Accounting and Information Management Division, Washington, D.C.	Rona B. Stillman, Chief Scientist for Computers and Communications Randolph C. Hite, Assistant Director Keith A. Rhodes, Technical Assistant Director David A. Powner, Evaluator-in-Charge Shane D. Hartzler, Communications Analyst
Denver Regional Office	Joseph P. Sikich, Staff Evaluator

Mr. ROHRABACHER. Mr. Brock, thank you very much.

I would just—I see that the Chairman has already taken the prerogative to expressing his opinion during your testimony. I would just like to thank each and every one of you for your testimony and being here today.

I think we have learned a lot. I think everybody on this panel has, and we know where to focus now to make sure we can solve these problems.

I am going to recognize Mr. Roemer as the first person to question you today, but in the meantime let me apologize. I am going to be on the Floor for a few minutes to give a speech on a technology issue. As soon as I give that speech on the Floor dealing with patent law, which is important to the development of these new technologies that we are talking about, I will then return.

Mr. Roemer, would you like to lead off?

Mr. Wamp will take over as chairman.

Mr. ROEMER. Thank you, Mr. Chairman.

Again, before you leave, I just want to thank you for having these hearings and the bipartisan nature in which you worked together with Democrats and Republicans on the authorization bill to make sure that we have public safety as a high priority in all our Districts in the United States.

With that in mind, the Chairman also talked about protections and warnings. He spent the night in a root cellar back when he was a young child.

That is what we are asking from our constituents in northern Indiana who are not getting the adequate warnings and protection at this point.

I have talked at length with Dr. Friday and Mr. Gordon about the severe weather lake-effect situation, with thunderstorms and snow coming off of Lake Michigan and dumping six and seven inches of snow in less than two hours on my District; the threat to school children getting on school buses.

We want to make sure that we see that this problem is addressed and that we work in conjunction with a modernization plan that protects all our citizens, and includes public awareness and public input from our Skywarn people, and from our meteorologists and from our average citizen.

I just want to ask a couple of basic questions to you, Dr. Friday.

First of all, the response to the NRC recommendations. You say in your written testimony that that is on time. Is that correct?

Dr. Friday. Yes, sir. We expect to have that available in November.

We are, as Dr. Gordon indicated, we have gone through and presented to the NRC committee the preliminary results of that study, but it is in the process of being reviewed at the present time by the department, and it will go through then a vetting before the Modernization Transition Committee, as we had agreed to in our procedures. That meeting is scheduled to take place on the 30th of this month.

Then, shortly after that, the Secretary should make the final determinations to complete that—

Mr. ROEMER. Now will you brief Members of Congress in between the Secretary's announcement and when it is released, when that meeting takes place on October 30th?

Dr. Friday. The exact release mechanism, quite honestly sir, has not yet been completely worked out. We will not surprise the Members of Congress that are involved in this discussion with a release, however, before you are notified explicitly what the results of that are.

But the exact mechanism for doing that has not yet been worked out.

Mr. ROEMER. So there will be, I assume, a briefing for Members of Congress that are interested in this in conjunction with the release of the recommendation?

Dr. Friday. Yes, sir.

Mr. ROEMER. You said in your testimony that there will be some questions answered and some not answered. You said you do not want to talk today about what is answered. Can you talk to us about what is not answered in the report?

Dr. Friday. No. I think I said there will be some Members that have expressed concerns that will be pleased with the results and some that may not be as pleased.

Mr. ROEMER. I was afraid you might say it that way.

Dr. Friday. That is what I meant when I said "some concerns will be answered and some concerns will"—they will be addressed, but the results may not be exactly what some of the Members were concerned with.

Mr. ROEMER. Before I go to Mr. Gordon and Mr. Floyd Hauth for a couple of questions, let me ask you one final question.

In drafts of the reconciliation language we see funding reductions for the Weather Service that are about 25 to 30 percent.

What impact will this have on our current weather offices? And what impact would that have on our modernization and NEXRAD plans?

Dr. Friday. Well, I was very pleased to hear the chairman say that the 25 percent across the board was never the intention in the Reconciliation Bill, because a 25 percent reduction in the operation of the National Weather Service would have a devastating effect on us being able to carry out a modernization, or even an operation of our existing services at the present levels.

We are very heartily a personnel-oriented organization. Even though we are putting in a great amount of technology at the present time with this capitalization in the modernization, we still have 70-plus percent of our funding going into personnel costs.

It is those personnel that are on the front lines of the weather events that use this technology to produce the improved warnings and forecasts.

A 25 percent reduction, when you start talking about those massive reductions, you are talking about redesigning a Weather Service for this Nation.

Mr. ROEMER. So all the work on the Authorization Bill that we have done in a bipartisan way would be wiped off the legislative maps if the Reconciliation Bill goes through as currently drafted.

Dr. Friday. We would have to completely redesign a Weather Service at that kind of funding level.

Mr. ROEMER. Thank you, Mister—Dr. Friday.

Mr. Hauth, in your testimony you said that you wanted to locate, or you thought it might be a recommendation of the Committee to locate NEXRAD at existing weather station sites.

What do you mean by that?

Mr. HAUTH. A fair number of the NEXRADs replace, are direct replacements so far as locations, and that is what I meant—that we were not considering adding additional ones. I mean, we were not considering additional sites beyond what the coverage, the location and the coverage that was indicated by National Weather Service in their plan—not that there should not be additional NEXRADs, but the statement referred to in every location where a NEXRAD replaced a pre-NEXRAD there was no problem.

But when they are located some distance away, and that distance is arguable as far as what the effective range of the old radar and the new radar is, that then is when the determination has to be made on whether or not when the NEXRAD is some distance from the old site that it is replacing, whether it is as effective and fully effective to cover specific types of weather phenomenon.

Mr. ROEMER. So hypothetically if you had a Weather Service office and you were going to get a NEXRAD, then your argument, based on scientific data, is that the best place to locate that NEXRAD is where the pre-existing radar was?

Mr. HAUTH. That is probably reading a little bit more into it. Not necessarily.

For example, each radar has some—if you have some geographic effects, some topography problems, it might be useful to have the NEXRAD in a site other than directly where the old radar was.

But there are a lot of considerations that go into that. We were looking—once the radar is located, and once you have a national network of those, what technical capabilities does that radar then have in detecting?

Mr. ROEMER. In conjunction with the rest of the modernization plans.

Mr. HAUTH. That is right.

Mr. ROEMER. We have just written a letter to Dr. Friday making some recommendations for different sites across northern Indiana. Again, I want to just recommend that we are looking out for the public safety for all our citizens.

We look forward to working in a bipartisan way with the chairman and with Mr. Buyer and Mr. Souder in making sure people on northern Indiana are served.

Thank you, Mr. Chairman.

Mr. WAMP. [presiding] Thank you, Mr. Roemer.

Before I recognize Mr. Cramer, I have a couple of questions myself, and actually including one from Mr. Cramer so he can act as a witness and then as a questioner both.

My first question is for the gentleman from the National Research Council.

If you would, clarify the language in your report relative to greater coverage at the 10,000 foot level over the contiguous United States.

Is the statement then that we will have, and we do have under NEXRAD, better coverage from 10,000 feet than the current system does at 5,000 feet or lower?

Is that accurate?

Mr. GORDON. I am not sure what part of the——

Mr. WAMP [continuing]. study I am referring to?

Mr. GORDON [continuing]. report you are quoting, Mr. Chairman, but the coverage at 10,000 feet is far better with the NEXRADs than it was at 10,000 feet with the pre-NEXRAD.

Mr. WAMP. Right. I understand that.

My question is: Is it greater at 10,000 feet with NEXRAD than it was at 5,000 feet with the current system in those areas?

Mr. GORDON. I think the answer to that is that it is far better at 10,000 feet than the old system was at 5000.

Mr. WAMP. That is my question.

Because in those areas where there is topographic problems, the old system at 5000 feet still could not shoot in the valleys, and at 10,000 feet with NEXRAD you can actually shoot all the way down into the valleys and you actually get a better blanket coverage?

This is what I understand. I am trying to clarify on the record here that you actually get a better coverage at 10,000 feet on an NEXRAD than you used to get at a lower altitude.

Some of your weather forecasters do not understand this, or do not want to understand this; that somehow this does better from higher than the old system did from lower.

Right?

Mr. GORDON. Let me say to you, Mr. Chairman, as an engineer, that the radar waves travel in straight lines. The old radars and the new radars are no different in that sense.

The new radars are not able to look around the mountains, or to look over them and come back down.

The new radars are simply far more powerful and more sensitive, and they require less signal at the target, whatever the weather phenomenon may be, to detect it than the old radar.

So the detection is far better with the new radar. But there are no miracles here. There is nothing that violates the laws of engineering and the laws of physics. The radio rays go in straight lines. The curve of the Earth gets in the way.

A mountain gets in the way. That cannot be changed, and I am not sure anyone wants to change it.

Mr. WAMP. Good.

Mr. Friday, recently I received a letter from the Director of the Chattanooga-Hamilton County Metropolitan Airport Authority in Southeast Tennessee expressing his concerns over the Automated Surface Observation System, the ASOS.

In the letter he stated that the Airport's primary source of weather information, this ASOS, is being temporarily augmented by contract observers.

He is concerned about the contract observers not adequately responding to changing weather conditions that could affect safety.

I will ask unanimous consent that I can place a copy of that letter in the record.

[The letter referred to follows:]

CHATTANOOGA METROPOLITAN
AIRPORT AUTHORITY

P.O. Box 22444 • Chattanooga, Tennessee 37422 • (615) [illegible]200

OCT 11 1995

DON L. JONES
Chairman

WILLIAM H. TITTLE III
Vice Chairman

CLIFFORD BETTS, JR.
C. DUFFY FRANCK, JR.
JOHN P. FRANKLIN
JAMES C. HUDSON, JR.
W. LLOYD STANLEY, JR.

H. HUGH DAVIS, JR.
President

October 5, 1995

Honorable Zack Wamp
423 Cannon Office Building
1st & Independence Avenue, SE
Washington, DC 20515

Dear Zack:

I feel compelled to write concerning a potential aviation safety matter. The transition in the National Weather Service may be endangering lives.

As you know, at this time our primary source of weather information is the Automated Surface Observation System (ASOS). This is to be augmented, temporarily, by contract observers at the former Weather Service facility. Two recent incidents point up the shortcomings of this plan. On one occasion as visibility improved from IFR to VFR conditions, the FAA Control Tower was unable to get the observer to raise the number on the ASOS bulletin. While this does not affect safety, per se, it does affect operations significantly. On a second occasion, the ASOS report indicated VFR conditions even though visibility had decreased dramatically. When the observer would not adequately respond, the control tower issued its own reading. This is a safety issue.

As we approach winter, we become more concerned daily with the untrustworthy, generic information we're expected to use to make safety decisions. Your interest in this matter will be greatly appreciated.

Best wishes,

Hugh Davis
President

HD/cm

PS. Note I did not mention the dangerous loss of local weather radar.

Mr. WAMP. How do you address this issue?

Dr. Friday. Mr. Chairman, the automation of the Surface Observing System is one of the areas that has raised considerable concerns.

One of the things we are doing as a result in addressing those concerns is to have in the interim basis until we have resolved a lot of the technical issues with the ASOS itself, we are hiring contract people—in this case, the contract observers that you mentioned—to basically augment that observation system.

This is being done in conjunction with FAA and the aviation community.

This means that we have people that are sitting there all of the time doing nothing but watching the weather observation.

They are being paid to monitor that, to quality control that to make sure that it represents the weather.

In the past, for example at our Chattanooga office where we had our own weather observers at the airport taking the weather observations, this is the same weather observer that was also running the radar.

This is the same observer that was answering the telephone.

So that individual that was on duty around the clock was also doing all of the other items.

So he or she may or may not have been watching the weather when a change occurred.

I think you will see that when we do have contract observers dedicated solely to that function the responsiveness to the actual weather changes may actually be better than when we have our National Weather Service employees who are also responsible for doing a great number of other activities on the airport.

Mr. WAMP. Thank you for that statement. That is very valuable.

Mr. Cramer, if I could please digress a moment from the panel and ask you, what do you, sir, expect in the way of a time line?

The Secretary's report comes back theoretically in November, hopefully in early November.

If the Secretary confirms the National Research Council's suggestion that in possibly five areas we may have a potential degradation of service that could be satisfied with the addition of four of five additional radars, whatever is necessary, with the time constraints for site studies and the actual addition of the radar units which I understand are actually built or available, it is just a simple matter of going through the proper procedures to install those radars, and wherever you can share information and they can pitch in to help, I would like to understand how long this process would take in these five areas if in fact the Department of Commerce agrees to install radars in these five areas.

And, what do you expect in terms of interruption of service or, hopefully, noninterruption of service, from our local weather service offices and the existing weather? And how does this whole process work from your perspective from Huntsville, Alabama, and Chattanooga, Tennessee?

Mr. CRAMER. I thank you, Mr. Acting Chairman, and neighbor there in Southeastern Tennessee, we have got a lot at stake in this, as I referred to earlier, and we have enjoyed a very good working relationship over this and other issues as well.

Dr. Friday, I want to take that question and kind of steer it back to some of the dialogues that we have engaged in over the years now.

It seems even longer than that.

We have been concerned not only about the placement of NEXRADs and where they would be and the existing modernization plan and the whole gap area issue, but the way the service of this issue as well.

So I am going to bring both of those issues up and try to steer it around to north Alabama and southeastern Tennessee as an example.

When we got the National Research Council study back and had good discussions with you about that and exactly what the Congressman was asking me about, about the give and take of if Commerce passes off on this, and if they make a recommendation or follow this, and in turn say that we need to amend the modernization plan, we are trying to order this so that we do not have a chaotic situation and we do not have such a budget buster that we are starting totally all over again with an almost impossible scenario under even more difficult budget circumstances.

We were talking to you about where those NEXRADs would come from, as I recall.

Now it is one thing perhaps to come up with three or four. It is another thing if we have to come up with 10 or 15. But these discussions that I am now making reference to, in order to attempt to answer the question, are many weeks old.

We had testimony here today about the DOD NEXRADs and the number of those.

Could you first try to answer the question. If we had to come up with four more NEXRAD sites, where could you see, and from what kind of budget, assuming your budget is then close to what it is now, where would that funding come from and where could those NEXRADs come from? And what would it cost to maintain them?

Dr. Friday. I turned the [microphone] switch on very slowly because you asked a great number of questions there, some of which I may be able to provide some information on——

Mr. Cramer. I understand.

Dr. Friday [continuing]. and some of which I do not have answers to at this point.

The situation that Mr. Brock raised about acquiring excess surplus FAA radars for spare parts was done, quite frankly, in anticipation that there may be a requirement to add some radars to the system, some small number of radars to the system.

The FAA, in their evaluation of their priorities, had indicated the two radars that were not going to be used in the Continental United States, or in any of the United States' territories, were simply not going to be required for their revised program and they were about to basically turn those back to the contractor.

They had bought those radars at a very good, solid price.

In looking downstream at what we might require, we took a look at the possibility of acquiring those radars this year, this last fiscal year, and we did just that.

The assumption is this: If the review indicates that we do not need any additional radars, then we now have a spare parts supply that will last us through several years and we will be able to then not have to pay the money for the spare parts in the subsequent years. That is an ordinary part of our budget.

So in essence we save money whether we need the radars or whether we need the spare parts over what we would be doing if we bought brand-new spare parts from the contractor subsequently.

If we did require the addition of a few radars, then this would provide the basic equipment in order to build up at least four of those radars, because these happen to be doubly redundant systems that could be split apart into basically four components with some additional equipment coming on line.

But if that were the case, then we would have to basically have the money for the spare parts, et cetera, et cetera, et cetera, and have the money for the UPS systems that Mr. Brock pointed out to the conscious decision to go ahead and buy these.

But as was also pointed out by one of the first panel, and I can't remember just which one it was at the time, this saves the taxpayer in the order of $12- to $15 million by having these radars available as contrasted to having to go out and buy brand-new ones.

I felt that we did make a conscious decision, and I felt it was an appropriate decision to make because I really felt it was a winner all the way around.

Now I have set the stage for what would have to happen. Those radars still have to be assembled into a final configuration, and that will cost money.

We are in the process now as a part of the review team activities to try to come to grips with exactly what the budget implications were associated with that.

That information is not yet available to me. I simply do not have those final budget numbers, but that will be a part of the package that comes forward.

Any additional staffing requirements that result from that will also be a part of this budget process. So there are equipment costs that would be associated with assembling any new radars that would be required.

There would be siting costs associated with locating the ground to put these on, and building the facilities to install them on.

And if indeed new offices were required, or office structures were required, there would be those costs associated.

All of that is being put together as a part of the Secretary's report that is in the process of coming forward.

So I do not have the detailed answers to that.

Mr. CRAMER. I understand.

Dr. Friday. I hope that has given you something.

Mr. CRAMER. You are giving me a framework, which is all I can ask that you give.

Now let us try to come back to the chairman's question about time frames.

Commerce comes back in November in fact and says these four sites should be added, or these three sites should be added.

Would that—and I should know the answer to this, but I do not—would we then be amending the implementation plan, the Modernization Implementation Plan?

Dr. Friday. If there were additions to that, it would be modifying the implementation plan accordingly.

We would then have to go through and ensure that whatever the budgetary requirements were in 1996, 1997, 1998, whatever years those fell because there would be some cost in each one of the years going forward here, we would have to go through and modify budgets accordingly.

The 1997 budget year obviously is not here yet, but we would have to make sure that whatever continuity was required in the program to move forward reasonably fast would be possible.

We expect that if there are additional radars required, that those radars would be up and operating approximately 18 to 24 months after a decision to go ahead, assuming funding were available.

Mr. Cramer. So if next month that were to be recommended, then 18 to 24 months from next month?

Dr. Friday. You are trying to pin me down to a month, but that is the time frame.

Mr. Cramer. I hear you.

Mr. Chairman, if I might, let me just switch briefly, if I can, to the Weather Service offices.

You are in the process—you have come down from 300 Weather Service offices to how many now?

Dr. Friday. The plan calls for coming down from 300 locations, 300 offices, down to 118. That is the current strategic plan.

We have not yet closed finally and completely, any office.

We have gone through the certification process for the first six offices to be closed.

Although the final decision on the closing of those offices is pending its last review by the MTC at the present time.

We have in many places, where it has not impacted any of our products and services, we have reduced the staff in some locations and transferred county warning responsibilities where we felt that it was better to provide weather services from a NEXRAD site that was covering the area, as opposed to a non-radar site or some other locations.

So we have adjusted staff in some areas, but those offices are still virtually all open.

The only exception to that are offices where the only thing we did was operate a radar where that radar is no longer operating such as Garden City, Kansas.

The Dodge City facility is 30 miles away and it is completely op.

In the old Weather Service, the only thing we did at Garden City was run the radar that covered that part of the State.

No services came from that.

So in those areas we have actually closed facilities. But those were not a part of the legislative, the certification legislation. This is not a service office, for example.

Mr. Cramer. I will yield back to the Chairman.

Mr. Chairman, as you know, we can talk about this for a long time. But, for to allow other Members to have input, I will yield back.

Mr. WAMP. It is just you and me, and I am going to ask you another question, if you don't mind.

[Laughter.]

Mr. CRAMER. This is a unique experience here.

[Laughter.]

Mr. WAMP. Well, this is important to both of us. I think that now all the Members have left except you and I, if we could get these gentlemen to agree to go ahead and put this——

Mr. CRAMER. We can locate it this afternoon.

Mr. WAMP [continuing]. in Jackson County, Alabama; it is going to go in the northeast corner of Alabama to service both the 3rd District of Tennessee and what District of Alabama?

Mr. CRAMER. Fifth.

Mr. WAMP. The 5th District of Alabama.

Actually, you do not have to build two.

Just build one. You get two districts, two areas all-encompassing.

I have got a pen here if you want to sign anywhere and we can go ahead and put this in ink.

Your amendment last week to the Omnibus Science Reauthorization Bill, obviously the Senate would have to act and the President would be involved, but as you saw that coming about, what do you hear from the Department of Commerce from their perspective in terms of in the event that Secretary Brown verifies these areas as problem areas, then will those Weather Service offices that are scheduled to be closed in those immediate areas of those areas of potential degradation be closed?

Or, will the old radar come off line?

Explain how that should work based on what you hear from the Department of Commerce.

Mr. CRAMER. I can only tell you what I have deduced from many rounds of discussion both at the Commerce level, the Vice President's level, and at the level of the panelists here before us.

My question—and again, since it is just the two of us—what I was working toward with the Weather Service Office issue was to say, if our area got a NEXRAD, my concern is, as well, the Weather Service Office there.

Because we had a tornado—excuse me.

We had a storm system that moved into Alabama from Mississippi. Lightening struck the Weather Service Station there in Huntsville, and we were in fact covered from that dreaded Shelby County, Alabama office which is 100 miles south of us with a lot of hills, mountains, foothill terrain in between there that is not Norman, Oklahoma terrain.

I met with my Emergency Management people from all over north Alabama and southern Tennessee and they said that the coverage from the Birmingham Weather Service Office was miserable.

So I took that issue—again, they said it in a lot more detail than it was just "miserable."

They gave examples from county to county, how they relayed their system, and how they had maybe a minute or two minutes notice for this weather system that eventually hit there in Mr. Bevel's Congressional District, not my Congressional District.

But we used that as an example of a way to dissect what would our situation be if our Weather Service Office closed.

So I think, Dr. Friday, it would seem to me that if new NEXRADs are added, and if our area which seems to be a likely area, if any area is to be covered, there is likely to be one recommended for our area—and that is my opinion—what kind of coverage can we then expect?

Would the Birmingham, or Shelby County Weather Service Office be staffed better than it is staffed so that they could then work the NEXRAD information and get that adequately out to an area that they have not been used to covering?

Because it seems to me that if you add NEXRAD sites, that puts pressure on offices, particularly if another Weather Service Office is closed, that you have got to compensate for that somewhere.

On the other hand, it becomes a budget issue as well.

So I hope it would either mean that we would get to keep our Weather Service office open, or that we would be reassured that before we are subjected to coverage from that far south for a new NEXRAD, that we at least have that office's pattern of behavior and staffing and all looked at so that we could be adequately covered.

Dr. Friday. Let me respond to that, Mr. Cramer.

There are several cases where we have more than one NEXRAD radar that an office is using to cover its area of responsibility.

Mr. Cramer. From one office?

Dr. Friday. In several of those cases we have indeed, if the weather situation requires it, we have indeed augmented the staff above the core staff at those sites. That is in general the practice.

One of the questions that I was asked by Mr. Rohrabacher in the letter of invitation was to address the issue, for example. Why has the staffing changed from the original modernization plan to the current projections that we have?

Part of that comes about from issues exactly as you have indicated there.

In some cases there were offices that had been added by either Congressional action or by the Air Force moving out of a position that we had to cover in order to provide support.

For example, in Guam.

In other areas there was a recognition that we simply did not have enough staff associated to cover some of the NEXRADs in high-weather incidents.

Clearly, if—and, boy, this "if" keeps being used a lot here in this discussion back and forth—but if there were another radar going into the northern Alabama-Tennessee area here, then I would expect that there would be some additional staffing requirements one way or the other in here in order to do that.

But again, that is a part of the review that is going on at the present time.

We simply do not have the ability to respond completely to that at this point.

Mr. Wamp. Let me ask, if I could, Dr. Friday, then. From your perspective, or from the Secretary's perspective, do you believe that there will be exceptions to the current plans to downsize the Weather Service offices from 300 to 118, or whatever the number was?

Do you think that at least for the next two years we might have, with the exception of this Weather Service office, this Weather Service office, this Weather Service office?

Do you think that is a likelihood, in the event the Secretary of Commerce—I know "if" comes up—but in the event that the Secretary—first you have to say in the event the Secretary of Commerce is still the Secretary of Commerce, I guess.

That is the first "if." Hopefully that will all be resolved by the middle of November and we have got a structure from which to work.

But can you see that happening, potentially, that these Weather Service offices do not automatically close next summer?

Dr. Friday. If there were a decision by the Secretary that augmentation of the strategic plan as it is currently envisioned is required, those offices in those areas will simply not close.

That does not make any sense to close those until we are ready to back them up with the new system.

Mr. CRAMER. Dr. Friday, I—if I may, Mr. Chairman—if your budget is impacted any more by reconciliation, then what I heard earlier was that you would have to redesign the entire—I mean, you would have to take a whole new look at everything we have talked about?

Dr. Friday. That is correct, sir.

The fact is that we have designed the Weather Service based on the technologies that we are talking about, but those technologies, as was pointed out by Dr. Gordon and by someone else that raised the issue—I guess it was Mr. Thornberry—raised the issue of staffing levels at Norman in covering 50,000 square miles of area.

One of the things that we are going through right now in the modernization is a very careful evaluation of our staffing levels in these offices that we now have fully functioning such as Norman.

One of the areas of very major concern is whether or not we have enough staff there to use the technology to do the type of detailed small-scale forecasting and weather warning that we believe should be provided to the American public.

This technology is fantastic, but it requires talented, trained individuals to use it in order to provide the service.

The technology by itself will do nothing.

If we do not have sufficient people in these offices to carry out the duties of interpreting these data sets, of bringing them together with the AWIPS system for example, then we will end up with worse services, even with better technology, than we have at the present time.

That is a real problem that we are facing.

If we were faced with a 25 percent reduction in budget, or staff, or whatever, along that line, we would have to consider how we would really be able to provide and what level of weather services we would provide to the Nation. It would not be what we are planning in the modernized service.

Mr. CRAMER. Thank you.

Mr. WAMP. Gentlemen, all three of your organizations provide critical services to this country in a very efficient way, and we are grateful for not only your time here today but for what you and your colleagues do at your respective positions.

I personally thank you very much for allowing us to have this meeting publicly on the record, Congressman Cramer and I, which could have been held in our offices, but we would not have had—we did not have to take notes this way.

I ask unanimous consent before we adjourn that the record for this hearing be kept open until November the 30th of 1995 for the Secretary of Commerce to submit his review of the NRC study which we will then make part of this formal record of this hearing.

With that, this subcommittee hearing stands adjourned.

[Whereupon, at 3:05 p.m., Tuesday, October 17, 1995, the hearing was adjourned.]

[The following statement was received for the record:]

Testimony of Representative Earl Pomeroy
Committee on Science
Subcommittee on Energy and Environment
October 17, 1995

Mr Chairman, I appreciate the opportunity to submit testimony regarding the National Weather Service's implementation of the Next Generation Weather Radar (NEXRAD).

I want to state for the record that I am very supportive of using advanced technology to improve weather forecasting services for our country. I have been impressed by the improved capabilities a NEXRAD facility offers when it replaces an older radar at the same location.

However, I want to express my concerns when an older radar is decommissioned and NEXRAD radars over 100 miles away are the replacement facilities. This is the situation the western part of North Dakota faces due to the National Weather Service's modernization plan.

When the current radar at Williston is decommissioned, the closest radar will be 120 miles away in Glasgow, Montana. The next closest radar will be located at the Minot AFB, 130 miles in the opposite direction. In its report, the National Research Council noted that these distances are longer than any other created by the modernization program.

Under this scenario, western North Dakota will have the largest non-obstructed geographic area without full radar coverage in the country.

Even though the population of Western North Dakota is sparse, the farmers and ranchers in this region deserve the same quality of weather forecasting services as the remainder of the country. The weather in my state can be severe and extreme, and sufficient forewarning saves lives and property.

- 95% of the tornadoes in this area are those most difficult to detect with an elevated NEXRAD radar beam.

- A consulting radar meteorologist for Williston found that a radar over 100 miles away would be inadequate for winter snow storms, tornado vortex signatures, microbursts and gust fronts.

While an Automated Surface Observing System (ASOS) will be located at Williston, the Committee itself has noted its concerns regarding reports that ASOS may not meet its design performance criteria.

By moving forward with the current plan, we are implementing a faulty system where the distant NEXRAD radars cannot detect certain weather phenomena and the bugs haven't been worked out of the Automated Surface Observing System.

Good, reliable weather forecasting is critical to everyone. When living in a rural area, travelling long distances daily is a fact of life. Whether it is a child riding the school bus, a spouse driving to the next town to his or her job or a farmer working in a distant field; they all depend on reliable, up-to-date weather information.

As the National Weather Service continues to implement its modernization program, I urge the Committee to remain vigilant in ensuring that as we utilize new technology, we are not letting some areas fall through the cracks.

Last week, I strongly supported Mr. Cramer's amendment to H.R. 2405 which restored a streamlined process requiring the National Weather Service to certify that no degradation of service will occur due the restructuring of weather offices. I urge the Committee to retain the modified certification process as the modernization plan is implemented.

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